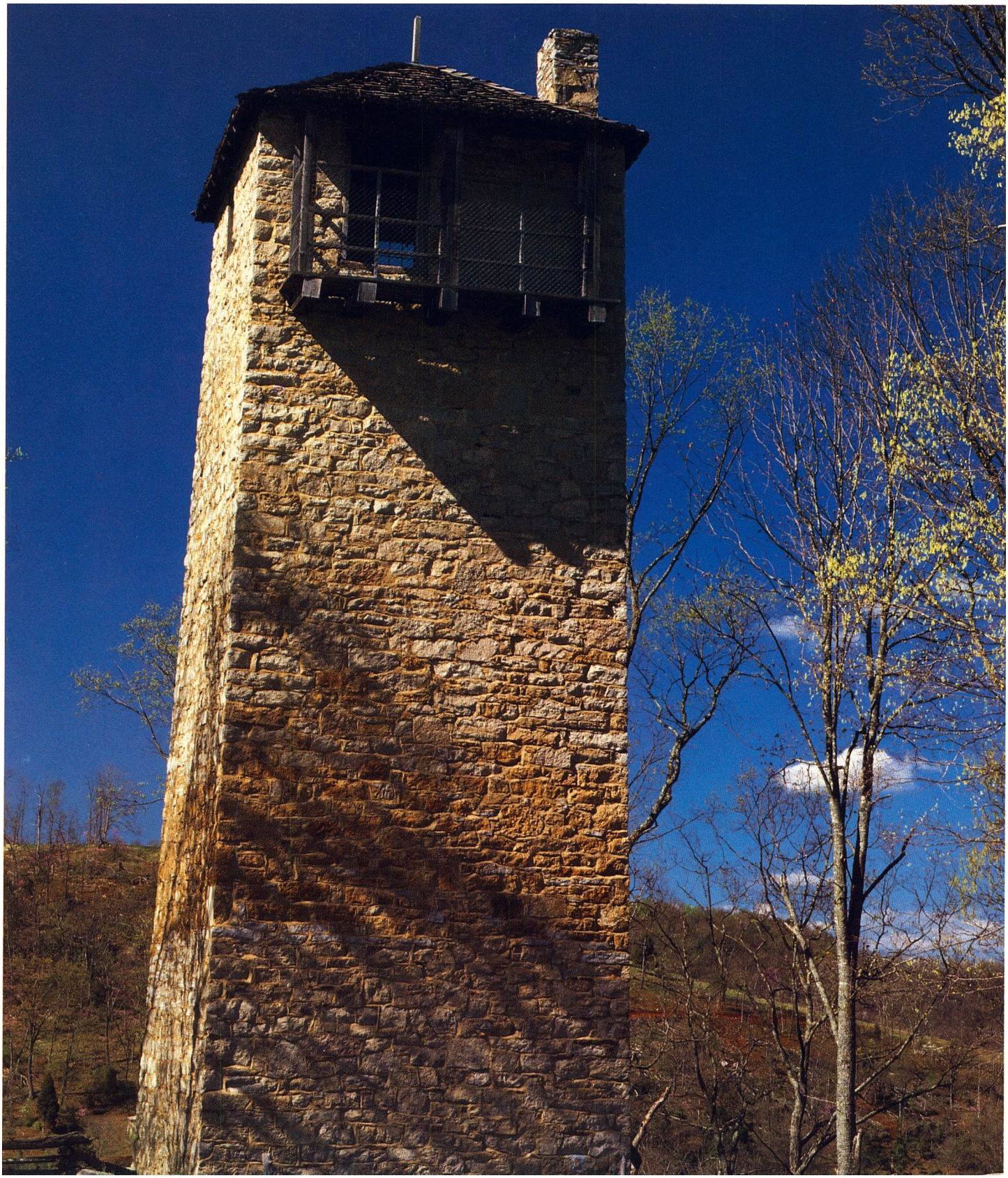
United States Department of Agriculture

Soil Conservation Service

In cooperation with Virginia Polytechnic Institute and State University

Soil Survey of Wythe County, Virginia



How To Use This Soil Survey

General Soil Map

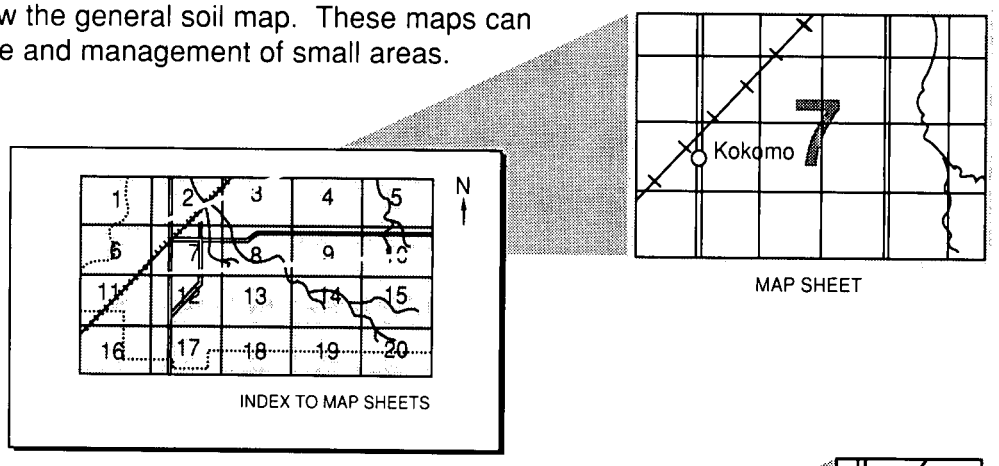
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

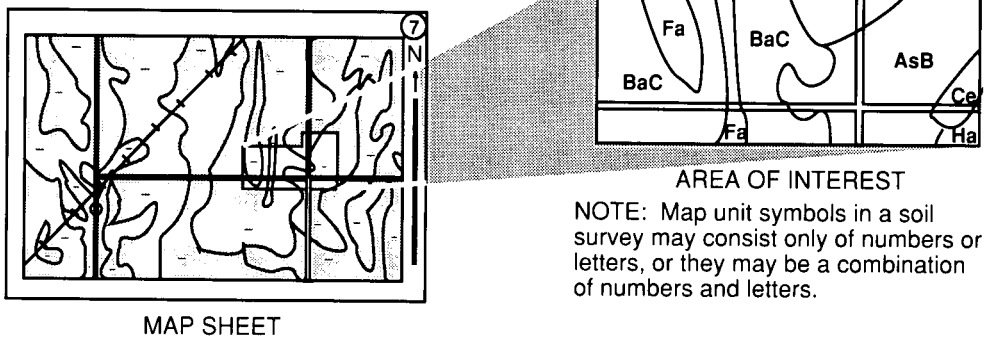
To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

MAP SHEET

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



MAP SHEET

AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1988. Soil names and descriptions were approved in 1988. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1988. This survey was made cooperatively by the Soil Conservation Service and the Virginia Polytechnic Institute and State University. It is part of the technical assistance furnished to the Big Walker Soil and Water Conservation District. The Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, and the Wythe County Board of Supervisors provided financial assistance for the survey.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: The Shot Tower at Jackson's Ferry, built by Thomas Jackson in 1807. The tower is in an area of Shottower loam, 2 to 7 percent slopes.

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Issued August 1992

Index to Map Units

Summary of Tables

Foreword

This soil survey contains information that can be used in land-planning programs in Wythe County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

George C. Norris
State Conservationist
Soil Conservation Service

Soil Survey of Wythe County, Virginia

By Dean A. Gall and William J. Edmonds, Virginia Polytechnic Institute and State University

Fieldwork by Dean A. Gall, Alexander C. Blacksburg, and Ronald W. Straw, Virginia Polytechnic Institute and State University

United States Department of Agriculture, Soil Conservation Service,
in cooperation with Virginia Polytechnic Institute and State University

WYTHE COUNTY is in the southwestern part of Virginia (fig. 1). It is about 75 miles southwest of Roanoke and 260 miles southwest of Richmond. It has a total area of 297,400 acres, or about 465 square miles. About 56,800 acres is in the Jefferson National Forest. The population of the county is 25,600. The population of Wytheville is 7,135, and that of Rural Retreat is 1,083.

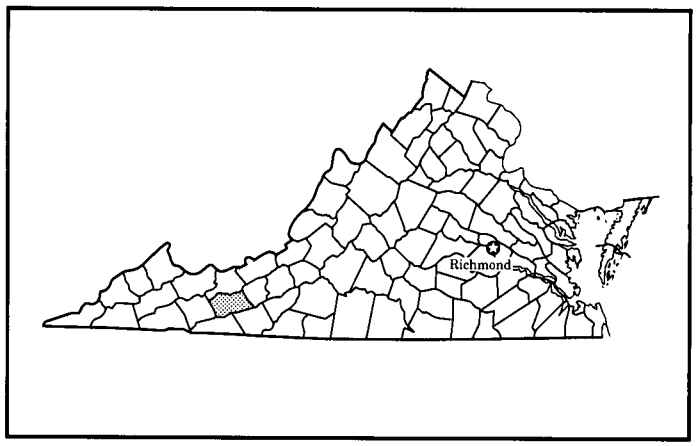

Figure 1.—Location of Wythe County in Virginia.

General Nature of the County

This section gives general information about the county. It describes early history; climate; physiography, geology, relief, and drainage; transportation facilities; land use; and water supply.

Early History

Prior to settlement by Europeans, the region west of the Blue Ridge was inhabited by the Cherokee, Catawba, and Iroquois Indians. A well-worn footpath, later known as the Great Road, extended through the Great Valley. It connected the Iroquois Confederacy in the north with the Cherokee and Catawba Indians in the south.

Explorations by John Lederer and Alexander Spotswood and his Knights of the Golden Horseshoe created interest in settling the region west of the Blue Ridge once known as Augusta County. Settlement was encouraged by several land companies, the most successful of which was the Loyal Land Company, which was directed by Thomas Walker. Settlement of the area now known as Wythe County began in about 1743, when several families settled along Reed Creek.

In 1756, Colonel John Chiswell, hiding from a band of Indians, discovered lead and zinc deposits in the walls of a cave at Lead Mines, a community now known as Austinville. Lead mining began shortly thereafter and continued until 1982. Daniel Boone, General Andrew Lewis, and other famous colonial frontiersmen stopped at Lead Mines. In 1775, the Fincastle Resolutions, forerunner of the Declaration of Independence, were drawn up at Lead Mines.

Fincastle County was formed from Augusta County in 1772. The county seat was at Lead Mines. Fincastle County became part of Montgomery County in 1777. The county seat was at Fort Chiswell, a military depot on the Great Road to the west. In 1790, Wythe County was formed from Montgomery County. The county seat was initially at Fort Chiswell, but it was moved to

Abbeville (later known as Evansham), then to Wythe Court House, and finally to Wytheville, which was incorporated in 1839. The county was named for George Wythe, a Williamsburg lawyer, a signer of the Declaration of Independence, and the designer of the state seal of Virginia.

In 1807, Thomas Jackson built the Shot Tower at Jackson's Ferry to produce shot from lead mined at Austinville. The Shot Tower was designated as a state park in 1968 and as a national historic mechanical engineering landmark by the American Society of Mechanical Engineers in 1981.

Austinville was the chief domestic supplier of lead to the Confederate Army during the Civil War and was attacked twice by Union troops. An attempt to take Wytheville in 1863 by a detachment of Union cavalry was thwarted by Molly Tynes, who rode 40 miles over the mountains from Tazwell County to warn the home guard that the Yankees were coming. The alerted home guards turned the Union cavalry away.

Climate

Prepared by the Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Wytheville in the period 1955 to 1985. Table 2 shows the probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 34.4 degrees F and the average daily minimum temperature is 23.4 degrees. The lowest temperature on record, which occurred at Wytheville on January 21, 1985, is -20 degrees. In summer, the average temperature is 69.6 degrees and the average daily maximum temperature is 82.3 degrees. The highest recorded temperature, which occurred at Wytheville on August 20, 1983, is 97 degrees.

Growing degree days are shown in table 3. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 38 inches. Of this, 20.71 inches, or about 54 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 28.45 inches. The heaviest 1-day rainfall during the period of record was 4.85 inches at Wytheville on July 18, 1964. Thunderstorms occur on about 13 days each year.

The average seasonal snowfall is 27.0 inches. The heaviest 1-day snowfall on record was 18 inches.

Physiography, Geology, Relief, and Drainage

Wythe County is in the Blue Ridge and Valley and Ridge physiographic provinces. The Great Valley extends through the county. It is bounded on the north by the Allegheny Mountains and on the south by the Blue Ridge (fig. 2). Lick Mountain is an isolated system of ridges in the Great Valley.

Relief in the county is a result of the folding and faulting of sedimentary rocks by mountain-building processes. During a long period of geologic erosion, ridges formed in areas of the more resistant rocks in the mountains and valleys formed in areas of the less resistant rocks.

The Blue Ridge is a rugged, mountainous region of high relief. Sloping to moderately steep ridges are underlain by quartzite and sandstone, and steep and very steep side slopes are underlain by phyllite, shale, siltstone, and sandstone. Elevation in this region ranges from 2,700 to 4,000 feet above sea level.

The Great Valley is a rolling and hilly region of relatively low relief. The rolling areas are generally underlain by limestone and shale and the hilly areas by shale, siltstone, and sandstone. Elevation in this valley ranges from about 1,900 feet in an area where the New River leaves the county to 2,600 feet.

Lick Mountain is a rugged, mountainous area within the Great Valley. It is an area of high relief and has peaks as high as 3,400 feet. It is underlain dominantly by sandstone and quartzite.

The Allegheny Mountains occur as a rugged, mountainous region of high relief. Sloping to moderately steep ridges are underlain by sandstone and quartzite, and steep and very steep side slopes are underlain by shale, siltstone, and sandstone. Elevation in these mountains ranges from about 2,200 to 3,900 feet.

The New River is the major drainage outlet in the county. Reed and Cripple Creeks, the major tributaries of the river, drain most of the county. A small area in the western part of the county is drained by the Holston River.

Transportation Facilities

Interstate 81 and Interstate 77 intersect at Fort Chiswell and Wytheville. Interstate 81 runs northeast-southwest, and Interstate 77 runs north-south. U.S. 11, U.S. 21, and U.S. 52 also serve the county.

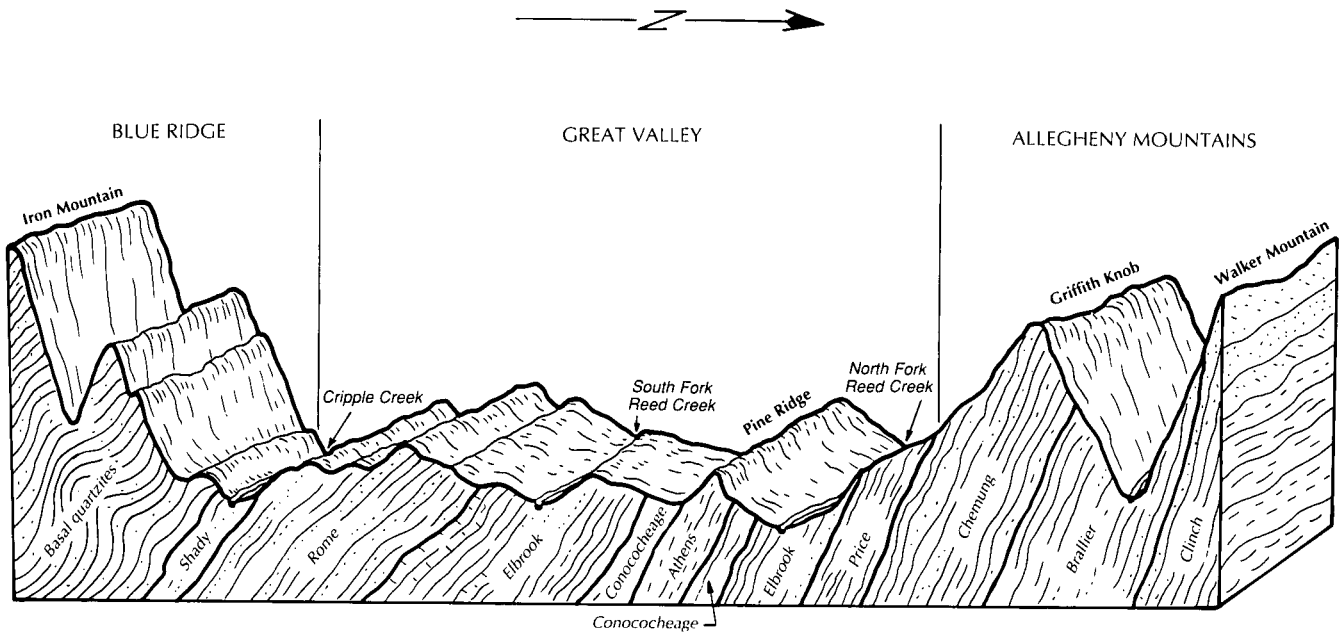

Figure 2.—A north-south transect of the bedrock geology in western Wythe County. The horizontal scale is 1:150,000. The vertical scale is exaggerated 150 times.

Rail freight service is available at sidings in Max Meadows, Wytheville, Crockett, and Rural Retreat. Interstate carriers provide trucking freight service.

Land Use

Farming is the most important land use in Wythe County. About 167,000 acres in the county is farmland. Crops are harvested on about 26,500 acres. The valleys are used mainly for beef, dairy, and sheep farming. The soils in the valleys are suited to pasture, hay, and grain crops. The nearly level to moderately steep soils are used for crop production. The moderately steep to very steep soils and the soils in areas that have rock outcrops are used as pasture or woodland.

Residential, commercial, and industrial areas are in the Great Valley. Residential development is expanding into the rural areas. Commercial development is occurring along Interstate 81 and Interstate 77, especially between Wytheville and Fort Chiswell. Industrial development is concentrated in Wytheville and Rural Retreat. Manufactured products include agricultural lime, machine parts, clothes, rubber products, engineered plastics, and electrical components.

Wythe County has about 103,200 acres of woodland, including the Jefferson National Forest. Mountainous areas are used for woodland and recreation. Most of the timber stands are oak-hickory on the better sites and oak-pine on marginal sites. Soils that have a low available water capacity, are steep, or are in areas where access is limited support native trees. Soils that have a higher available water capacity and are more gently sloping support upland oak-hickory stands that produce a large amount of high-quality timber.

The Jefferson National Forest, which has a diversity of vegetation and wildlife, provides excellent opportunities for hunting, fishing, camping, horseback riding, and hiking. Comers Rock, Hale Lake, Hussey Mountain, and Raven Cliff are among the recreational areas in the county.

The Appalachian Trail, one of the most beautiful and diverse trail sections in Virginia, is accessible at Groseclose, in Smyth County. Buzzard Rock, White Top Mountain, Rhododendron Gap, Pine Mountain, Chestnut Knob, and Brushy Mountain provide esthetic vistas. The state parks in the county are the Shot Tower, Rural Retreat Lake, New River Trail, and Carter's Wayside.

Water Supply

Water for residential use is available from wells and springs throughout the county. Ground water is hard in areas underlain by limestone. The quantity of the ground water in the mountains is influenced by seasonal precipitation. The ground water along fault zones commonly contains undesirable levels of

sediment. Iron and sulfur influence the quality of the water in some areas underlain by acid shale.

The major sources of surface water for municipal, industrial, and residential uses are the New River, Reed Creek, Cripple Creek, and their tributaries.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material has few or no roots or other living organisms and has been changed very little by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for

the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Some of the soil names and boundaries of map units on the general soil map of this county do not match those on the maps of adjacent counties. Differences are the result of changes in the classification system or in soil series concepts.

Soil Descriptions

1. Jefferson-Weikert-Berks

Very deep, shallow, and moderately deep, sloping to very steep soils that have a loamy subsoil and a high content of rock fragments; formed in colluvium derived from sandstone and shale or residuum of shale interbedded with siltstone and sandstone

These soils are in the Allegheny Mountains. The landscape is dissected by deep, V-shaped drainageways, which occur in a dendritic pattern. Interfluves have narrow ridgetops; long, convex side slopes; and colluvial foot slopes. Slopes range from 7 to 65 percent.

About 90 percent of the acreage is woodland. Cleared areas, which are primarily on foot slopes, are used for pasture or cultivated crops.

This map unit makes up about 13 percent of the county. It is about 24 percent Jefferson and similar soils, 20 percent Weikert and similar soils, and 20 percent Berks and similar soils. The minor Lily, Dekalb, and Rayne soils make up the rest of the unit.

The sloping to very steep Jefferson soils are on concave side slopes and foot slopes. They are very deep and well drained. They have a loamy subsoil. They formed in colluvium derived from sandstone and shale.

The sloping to very steep Weikert soils are on the summits, shoulder slopes, and side slopes of upland ridges. They are shallow and well drained. They have a loamy subsoil in which the content of rock fragments is high. They formed in residuum of shale interbedded with siltstone and sandstone.

The sloping to very steep Berks soils are on the summits, shoulder slopes, and side slopes of upland ridges. They are moderately deep and well drained. They have a loamy subsoil in which the content of rock fragments is high. They formed in residuum of shale interbedded with siltstone and sandstone.

The major soils are generally unsuited to cultivated crops, hay, and pasture. The slope, a low available water capacity, low natural fertility, a high erosion potential, and restricted accessibility are the main limitations.

These soils are suitable for trees. Chestnut oak, sourwood, scarlet oak, white oak, red oak, and white pine grow on southern exposures. Northern exposures support a larger percentage of white oak and hickory. Table Mountain pine and Virginia pine grow on northwestern exposures. Yellow poplar grows in coves. The slope, the erosion potential, a low available water capacity, and low natural fertility are management concerns.

2. Frederick-Hagerstown

Very deep and deep, nearly level to steep soils that have a clayey subsoil; formed in residuum of limestone interbedded with shale, siltstone, and sandstone

These soils are in the Great Valley. The landscape is dissected by numerous U-shaped drainageways, which occur in a dendritic pattern. Interfluves are rolling hills that have broad ridgetops and smooth, convex side

slopes (fig. 3). Slopes range from 0 to 45 percent.

About 95 percent of the acreage has been cleared and is used for cultivated crops, hay, or pasture or for residential or industrial development. Uncleared areas have steep slopes, rock outcrops, and karst topography.

This map unit makes up about 31 percent of the county. It is about 38 percent Frederick soils and 15 percent Hagerstown soils. The minor Marbie, Wyrick, Wurno, and Timberville soils make up the rest of the unit.

The nearly level to moderately steep Frederick soils are on smooth, broad summits, shoulder slopes, and side slopes. They are very deep and well drained.

The gently sloping to steep Hagerstown soils are on smooth, narrow ridgetops and convex side slopes. They are deep and well drained.

The major soils are suited to cultivated crops, hay, and pasture. In some areas they are used for dairy, beef, and sheep enterprises. The slope and the erosion potential are the main limitations.

These soils are suitable for trees. The major tree species are white oak, red oak, hickory, yellow poplar, black walnut, and black locust. The slope and the erosion potential are management concerns.

3. Chiswell-Groseclose-Litz

Shallow, very deep, and moderately deep, sloping to very steep soils that have a loamy subsoil with a high content of rock fragments or have a clayey subsoil; formed in material weathered from a heterogeneous mixture of shale, siltstone, limestone, and sandstone

These soils are in the Great Valley. The landscape is dissected by V-shaped drainageways, which occur in a trellis pattern (fig. 4). Interfluves are parallel ridges that have long, narrow ridgetops; long, convex side slopes;

Figure 3.—A typical area of the Frederick-Hagerstown general soil map unit.

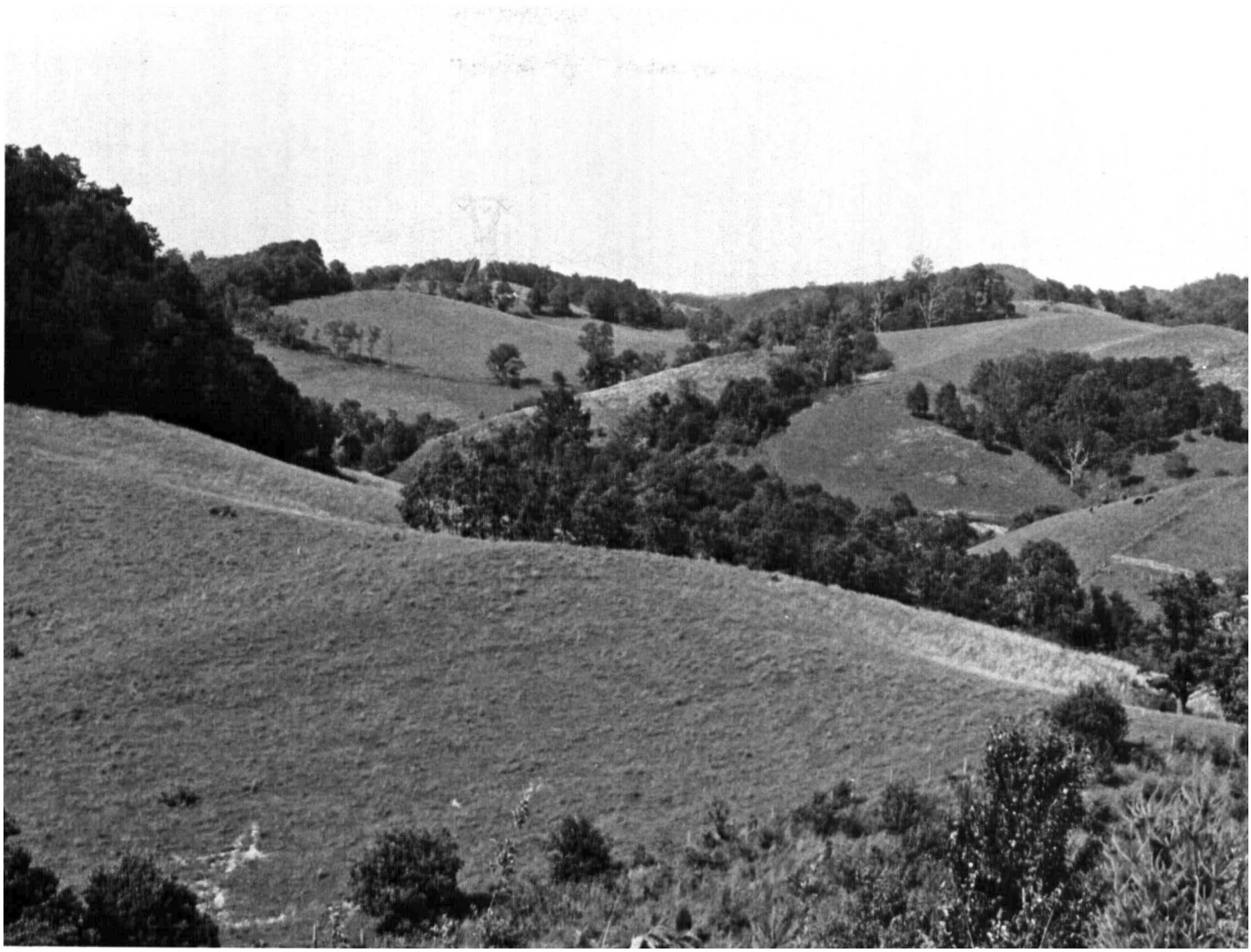

Figure 4.—A dissected area in the Chiswell-Groseclose-Litz general soil map unit.

and colluvial foot slopes. Slopes range from 7 to 60 percent.

About 50 percent of the acreage has been cleared. The cleared areas, which are on southern exposures, are used primarily for pasture. A small acreage is used for cultivated crops, which are are grown in areas where slopes are suitable. Uncleared areas are on narrow ridgetops and steep side slopes with northern exposures.

This map unit makes up about 31 percent of the county. It is about 27 percent Chiswell and similar soils, 20 percent Groseclose and similar soils, and 17 percent Litz and similar soils. The minor Timberville, Frederick, and Austinville soils make up the rest of the unit.

All of the major soils are sloping to very steep and are on ridgetops and side slopes. They are well drained. The shallow Chiswell soils have a loamy subsoil in which the content of rock fragments is high. They formed in residuum of interbedded shale, siltstone, and sandstone. The very deep Groseclose soils have a clayey subsoil. They formed in residuum of interbedded shale, siltstone, limestone, and sandstone. The moderately deep Litz soils have a loamy subsoil in which the content of rock fragments is high. They formed in residuum of interbedded shale, siltstone, and sandstone.

The major soils are generally unsuited to cultivated crops, hay, and pasture. The slope, a low available water capacity, and the erosion potential are the main limitations.

These soils are suitable for trees. The major tree species are white oak, red oak, hickory, white pine, black locust, black walnut, and yellow poplar. The slope and the erosion potential are management concerns.

4. Matneflat

Very deep, sloping to very steep soils that have a loamy subsoil; formed in colluvium derived from sandstone, quartzite, and shale

These soils are on Lick Mountain. The landscape is dissected by V-shaped drainageways at the higher elevations and U-shaped drainageways at the lower elevations. The drainageways occur in a dendritic pattern. Interfluves have both narrow and broad ridgetops, long side slopes, and long colluvial foot slopes. Slopes range from 7 to 65 percent.

About 95 percent of the acreage is wooded. Most of the cleared areas, which are on foot slopes adjacent to the valley floor, are used for pasture or cultivated crops.

This map unit makes up about 10 percent of the county. It is about 78 percent Matneflat soils. The minor Dekalb, Drypond, Sylvatus, and Sylco soils and areas of rock outcrop make up the rest of the unit.

The Matneflat soils are on foot slopes, side slopes, and low mountain summits and shoulder slopes. They are well drained.

The Matneflat soils are generally unsuited to cultivated crops, hay, and pasture. The sloping areas on the lower foot slopes are suited to pasture and hay and are poorly suited to cultivated crops. The slope, a low available water capacity, low natural fertility, stoniness, and the erosion potential are limitations.

These soils are suitable for trees. The major tree species are scarlet oak, chestnut oak, and sourwood, and the minor species include red oak, white oak, hickory, and white pine. Areas that have rock outcrop support Table Mountain pine and Virginia pine. Protected cove areas support a large population of yellow poplar. The slope, a low available water capacity, low natural fertility, and surface stoniness are management concerns.

5. Shottower-Austinville-Frederick

Very deep, gently sloping to steep soils that have a clayey subsoil; formed in alluvium derived from limestone, shale, siltstone, sandstone, quartzite, and crystalline rocks and in residuum of dolomitic limestone and limestone interbedded with shale, siltstone, and sandstone

These soils are in the Great Valley. The landscape is dissected by numerous U-shaped drainageways, which occur in a dendritic pattern. Interfluves are old river terraces and rolling uplands that have broad ridgetops and smooth, convex side slopes. Slopes range from 2 to 45 percent.

About 90 percent of the acreage has been cleared and is used for pasture or hay. Cultivated crops are grown in nearly level to sloping areas. Uncleared areas have steep slopes, rock outcrops, and abandoned open pit mines.

This map unit makes up about 13 percent of the county. It is about 39 percent Shottower soils, 17 percent Austinville soils, and 11 percent Frederick soils. The minor Hagerstown, Timberville, Speedwell, Marbie, and Wyrick soils make up the rest of the unit.

All of the major soils are on ridgetops and side slopes and are well drained. The gently sloping to moderately steep Shottower soils formed in alluvium derived from limestone, shale, siltstone, sandstone, quartzite, and crystalline rocks. The gently sloping to steep Austinville soils formed in residuum of dolomitic limestone. The gently sloping to moderately steep Frederick soils formed in residuum of limestone interbedded with shale, siltstone, and sandstone.

The major soils are suited to cultivated crops, hay, and pasture. The slope and the erosion potential are the main limitations.

These soils are suitable for trees. The dominant tree species are white oak, red oak, hickory, white pine, black walnut, black locust, and yellow poplar. The slope and the erosion potential are management concerns.

6. Sylvatus-Jefferson-Sylco

Shallow to very deep, sloping to very steep soils that have a loamy subsoil and a high content of rock fragments; formed in residuum and colluvium derived from phyllite, slate, shale, siltstone, quartzite, and fine grained sandstone

These soils are in the Blue Ridge province. The landscape is dissected by deep, V-shaped drainageways, which occur in a dendritic pattern. Interfluves have a wide range of local relief. The higher elevations have long, narrow ridgetops and very steep side slopes. The lower elevations have broad summits and shoulder slopes and steep side slopes. Slopes range from 7 to 65 percent.

About 95 percent of the acreage is used as woodland. Cleared areas, which are on foot slopes, are used for hay and pasture.

This map unit makes up about 2 percent of the county. It is about 20 percent Sylvatus soils, 20 percent Jefferson soils, and 16 percent Sylco soils. The minor Dekalb, Lily, and Derroc soils make up the rest of the unit.

The sloping to very steep Sylvatus soils are on

ridgetops and side slopes. They are shallow and well drained. They have a loamy subsoil in which the content of rock fragments is high. They formed in residuum of interbedded phyllite, slate, shale, siltstone, and fine grained sandstone.

The sloping to very steep Jefferson soils are on colluvial side slopes, benches, and foot slopes. They are very deep and well drained. They have a loamy subsoil. They formed in colluvium derived from sandstone, quartzite, and shale.

The sloping to very steep Sylco soils are on ridgetops and side slopes. They are moderately deep and well drained. They have a loamy subsoil in which the content of rock fragments is high. They formed in residuum of interbedded phyllite, slate, shale, siltstone, and fine grained sandstone.

The major soils are generally unsuited to cultivated crops, hay, and pasture. The slope, a low available water capacity, low natural fertility, and a high erosion potential are limitations.

These soils are suitable for trees. The dominant tree species are scarlet oak and chestnut oak, and the minor species include white oak, red oak, hickory, white pine, Table Mountain pine, and Virginia pine. The slope, a low available water capacity, and low natural fertility are management concerns.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the substratum. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Shottower loam, 2 to 7 percent slopes, is a phase of the Shottower series.

Some map units are made up of two or more major soils. These map units are called soil complexes. A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Marbie-Wyrick complex, 2 to 7 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, quarries, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Some of the soil names and boundaries of map units on the detailed soil maps of this county do not match those on the maps of adjacent counties. Differences are the result of changes in the classification system or in soil series concepts.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The "Glossary" defines many of the terms used in describing the soils.

Soil Descriptions

1B—Austinville silty clay loam, 2 to 7 percent slopes. This soil is gently sloping, very deep, and well drained. It is on smooth, broad upland summits in the Great Valley. Areas range from 5 to 100 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dusky red silty clay loam

Subsoil:
8 to 79 inches, dark reddish brown clay

Chiswell, Groseclose, and Matneflat soils are included in areas of this map unit. Chiswell and Groseclose soils are in landscape positions similar to those of the Austinville soil. Matneflat soils are on the lower colluvial foot slopes. Limestone rock outcrops are

included in some areas. Included areas make up about 20 percent of this unit.

Soil properties—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Low
Reaction: Very strongly acid to neutral
Surface runoff: Medium
Erosion potential: Medium
Tilth: Fair
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Potential for frost action: Moderate

This soil is used mainly for cultivated crops, hay, or pasture. It is prime farmland.

This soil is well suited to cultivated crops, especially corn and small grain. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, stripcropping, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. A starter fertilizer high in phosphorus and low in potassium and nitrogen should be applied in areas used for corn. Plant tissue tests should be used to monitor micronutrient requirements. Plant nutrient management should include animal manure analysis and utilization. Tilling when the soil is wet destroys soil structure, results in the formation of clods and an undesirable seedbed, and thus hinders seed germination.

This soil is well suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests.

The potential productivity of this soil for white oak is moderately high. The estimated annual production of wood is 285 board feet per acre. Timber can be easily managed on this soil.

Community development is limited by low strength, the shrink-swell potential, seepage, and restricted permeability. This soil is suitable as a site for buildings and sanitary facilities. Low strength and instability are limitations on sites for local roads and streets. These limitations can be overcome by strengthening or replacing the base material. The restricted permeability is a limitation on sites for septic tank absorption fields. It can be overcome by enlarging the absorption area. The shrink-swell potential is a limitation on sites for buildings. It can be overcome by strengthening the foundation.

The land capability classification is IIe.

1C—Austinville silty clay loam, 7 to 15 percent slopes. This soil is sloping, very deep, and well drained. It is on upland summits, shoulder slopes, and side slopes in the Great Valley. Areas range from 5 to 100 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dusky red silty clay loam

Subsoil:
8 to 79 inches, dark reddish brown clay

Chiswell, Groseclose, and Matneflat soils are included in areas of this map unit. Chiswell and Groseclose soils are in landscape positions similar to those of the Austinville soil. Matneflat soils are on the lower colluvial foot slopes. Limestone rock outcrops are included in some areas. Included areas make up about 20 percent of this unit.

Soil properties—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Low
Reaction: Very strongly acid to neutral in the surface layer and in the upper part of the subsoil and very strongly acid to moderately acid in the lower part of the subsoil
Surface runoff: Rapid
Erosion potential: Medium
Tilth: Fair
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Potential for frost action: Moderate

This soil is used mainly for cultivated crops, hay, or pasture. It is suited to cultivated crops, especially corn and small grain. The erosion potential is a management

concern. Runoff and erosion can be controlled by contour farming, stripcropping, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. A starter fertilizer high in phosphorus and low in potassium and nitrogen should be applied in areas used for corn. Plant tissue tests should be used to monitor micronutrient requirements. Plant nutrient management should include animal manure analysis and utilization. Tilling when the soil is wet destroys soil structure, results in the formation of clods and an undesirable seedbed, and thus hinders seed germination.

This soil is well suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests.

The potential productivity of this soil for white oak is moderately high. The estimated annual production of wood is 285 board feet per acre. Timber can be easily managed on this soil.

Community development is limited by the slope, low strength, the shrink-swell potential, and restricted permeability. This soil is suitable as a site for buildings and sanitary facilities. Low strength and instability are limitations on sites for local roads and streets. These limitations can be overcome by strengthening or replacing the base material. The slope and the restricted permeability are limitations on sites for septic tank absorption fields. These limitations can be overcome by installing the absorption field on the contour and enlarging the absorption area. The slope and the shrink-swell potential are limitations on sites for buildings. These limitations can be overcome by properly designing the buildings and by strengthening the foundation.

The land capability classification is IIIe.

1D—Austinville silty clay loam, 15 to 30 percent slopes. This soil is moderately steep and steep, very deep, and well drained. It is on upland side slopes in the Great Valley. Areas range from 5 to 100 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dusky red silty clay loam

Subsoil:
8 to 79 inches, dark reddish brown clay

Chiswell, Groseclose, and Matneflat soils are included in areas of this map unit. Chiswell and Groseclose soils are in landscape positions similar to those of the Austinville soil. Matneflat soils are on the lower colluvial fans. Limestone rock outcrops are included in some areas. Included areas make up about 20 percent of this unit.

Soil properties—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Low
Reaction: Very strongly acid to neutral in the surface layer and in the upper part of the subsoil and very strongly acid to moderately acid in the lower part of the subsoil
Surface runoff: Rapid
Erosion potential: High
Tilth: Fair
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Potential for frost action: Moderate

This soil is used mainly for cultivated crops, hay, or pasture. It is poorly suited to cultivated crops. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, stripcropping, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. A starter fertilizer high in phosphorus and low in potassium and nitrogen should be applied in areas used for corn. Plant tissue tests should be used to monitor micronutrient requirements. Plant nutrient management should include animal manure analysis and utilization. Tilling when the soil is wet destroys soil structure, results in the formation of clods and an undesirable seedbed, and thus hinders seed germination.

This soil is suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming.

Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests.

The potential productivity of this soil for white oak is moderately high on north and east exposures and moderate on south and west exposures. The estimated annual production of wood is 285 board feet per acre on north and east exposures and 270 board feet per acre on south and west exposures. Timber can be easily managed on this soil. The slope restricts the use of logging equipment. The erosion potential is a management concern, especially along logging roads and skid trails.

Community development is limited by the slope, low strength, the shrink-swell potential, and restricted permeability. This soil is poorly suited to building site development and sanitary facilities.

The land capability classification is IVe.

2E—Austinville-Rock outcrop complex, 10 to 45 percent slopes. This map unit is on upland side slopes in the Great Valley. The Austinville soil is sloping to steep, very deep, and well drained. This soil and the Rock outcrop occur as areas so intermingled that mapping them separately was not practical. This unit is about 45 percent Austinville soil, 30 percent Rock outcrop, and 25 percent included soils. Areas range from 5 to more than 100 acres in size.

A typical profile of the Austinville soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dusky red silty clay loam

Subsoil:
8 to 79 inches, dark reddish brown clay

Rock outcrops are dolomitic limestone. They are roughly 10 to 30 feet apart and cover about 25 to 50 percent of the surface (fig. 5).

Chiswell, Groseclose, and Matneflat soils are included in areas of this map unit. Chiswell and Groseclose soils are in landscape positions similar to those of the Austinville soil. Matneflat soils are on colluvial foot slopes.

Properties of the Austinville soil—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Low
Reaction: Very strongly acid to neutral in the surface layer and in the upper part of the subsoil and very strongly acid to moderately acid in the lower part of the subsoil
Surface runoff: Very rapid
Erosion potential: High
Tilth: Fair
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Potential for frost action: Moderate

This map unit is used mainly as pasture or woodland. It is generally unsuited to cultivated crops and hay. Crop production is limited by the Rock outcrop and the slope. The erosion potential is a management concern.

This map unit is generally unsuited to grasses and legumes for pasture. If the unit is used as pasture, grasses and legumes should cover a minimum of 70 percent of the surface. This plant cover is needed to control runoff and erosion. The Rock outcrop and the slope are limitations. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests.

The potential productivity of the Austinville soil for white oak is moderately high on north and east exposures and moderate on south and west exposures. The estimated annual production of wood is 285 board feet per acre on north and east exposures and 270 board feet per acre on south and west exposures. The Rock outcrop and the slope restrict the use of logging equipment. The erosion potential is a management concern, especially along logging roads and skid trails.

Community development is limited by the slope, the Rock outcrop, low strength, restricted permeability, and the shrink-swell potential. This unit is poorly suited to building site development and sanitary facilities.

The land capability classification is VIIs.

3B—Botetourt silt loam, 2 to 7 percent slopes. This soil is gently sloping, very deep, and moderately well drained. It is on stream terraces in the Great Valley. Areas range from 5 to 50 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 9 inches, dark yellowish brown silt loam

Figure 5.—An area of Austinville-Rock outcrop complex, 10 to 45 percent slopes. The Rock outcrop limits most agricultural and urban uses.

Subsoil:
9 to 23 inches, yellowish brown clay loam
23 to 47 inches, yellowish brown clay loam mottled with light brownish gray
47 to 52 inches, mottled yellowish brown and light brownish gray loam

Substratum:
52 to 72 inches, mottled yellowish brown and light brownish gray loam

Frederick, Ingledove, and Nomberville soils are included in areas of this soil. Frederick soils are on upland side slopes. Ingledove soils are on stream terraces. Nomberville soils are on flood plains. Soils that have a gravelly surface layer are included in some areas. Included soils make up about 25 percent of this unit.

Soil properties—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Moderate
Reaction: Strongly acid to slightly acid
Surface runoff: Medium
Erosion potential: Medium
Tilth: Good
Depth to the seasonal high water table: 18 to 30 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Potential for frost action: High

This soil is used mainly for cultivated crops, hay, or pasture. It is prime farmland.

This soil is well suited to cultivated crops, especially corn, small grain, and vegetables. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, stripcropping, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. When the soil is wet, vehicular traffic can cause compaction, which reduces crop yields. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant

nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for hay. Alfalfa and red clover stands are short lived because of wetness. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and white clover for pasture. Red clover stands are short lived because of wetness. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests.

The potential productivity of this soil for Virginia pine is high. The estimated annual production of wood is 555 board feet per acre. Wetness is a limitation affecting woodland management.

Community development is limited by wetness and the potential for frost action. The potential for frost action is a limitation on sites for local roads and streets. It can be overcome by strengthening or replacing the base material. The wetness is a limitation on sites for septic tank absorption fields and buildings. It can be overcome by installing a drainage system on sites for septic tank absorption fields and drains around footings on sites for buildings.

The land capability classification is IIe.

4C—Chiswell-Groseclose-Litz complex, 7 to 15 percent slopes. These soils are sloping and well drained. They are on upland summits, shoulder slopes, and side slopes in the Great Valley. The shallow Chiswell, very deep Groseclose, and moderately deep Litz soils occur as areas so closely intermingled that mapping them separately was not practical. This map unit is about 35 percent Chiswell soil, 25 percent Groseclose soil, 20 percent Litz soil, and 20 percent included soils. Areas range from 5 to 100 acres in size.

A typical profile of the Chiswell soil has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 3 inches, dark reddish brown very channery silt loam

Subsoil:
3 to 13 inches, reddish brown very channery silt loam

Bedrock:
13 to 72 inches, mottled yellowish red and reddish brown, weathered shale that crushes to silt loam

A typical profile of the Groseclose soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown silt loam

Subsoil:
8 to 28 inches, strong brown clay
28 to 42 inches, strong brown clay mottled with reddish yellow

Substratum:
42 to 72 inches, mottled reddish yellow and red silt loam

A typical profile of the Litz soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, reddish brown channery silt loam

Subsoil:
7 to 15 inches, reddish brown very channery silt loam and yellowish red silty clay loam

Substratum:
15 to 35 inches, reddish brown very channery silt loam

Bedrock:
35 inches, red shale

Austinville, Clubcaf, and Timberville soils are included in areas of this map unit. Austinville soils are in landscape positions similar to those of the Chiswell, Groseclose, and Litz soils. Clubcaf soils are on flood plains in narrow, V-shaped valleys. Timberville soils are on concave upland side slopes and along drainageways. Soils that have a stony surface layer are included in some areas.

The Chiswell, Groseclose, and Litz soils formed in material weathered from thinly bedded shale, limestone, and sandstone, which dip at angles of a few degrees to 90 degrees. Because the parent materials weather at different rates, the depth to bedrock and the texture vary within very short distances.

Properties of the Chiswell soil—

Permeability: Moderate
Available water capacity: Very low
Organic matter content: Low
Reaction: Extremely acid to moderately acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Poor

Depth to the seasonal high water table: More than 72 inches
Root zone: 10 to 20 inches
Depth to bedrock: 10 to 20 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

Properties of the Groseclose soil—

Permeability: Slow
Available water capacity: Moderate
Organic matter content: Low
Reaction: Extremely acid to strongly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

Properties of the Litz soil—

Permeability: Moderate
Available water capacity: Low
Organic matter content: Low
Reaction: Very strongly acid or strongly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

These soils are used mainly as pasture or woodland. A few areas are used for hay or cultivated crops.

These soils are poorly suited to cultivated crops. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, stripcropping, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

These soils are suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization. Because of a shallow rooting depth, alfalfa may be short lived on the Chiswell soil.

These soils are suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The soils are droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of these soils for northern red oak is moderately high. The estimated annual production of wood is 285 board feet per acre on the Chiswell soil, 360 board feet per acre on the Groseclose soil, and 285 board feet per acre on the Litz soil. Timber can be easily managed on these soils. Windthrow and seedling mortality are problems on the Chiswell soil.

Community development is limited by the slope, the depth to bedrock, low strength, restricted permeability, seepage, and the shrink-swell potential. The slope is a limitation on sites for sewage lagoons, small commercial buildings, ponds, and playgrounds. The depth to bedrock in the Chiswell and Litz soils is a limitation affecting uses that require excavation. The bedrock generally can be dug with track loaders. Seepage is a limitation if the Chiswell and Litz soils are used as sites for sanitary facilities. It can result in the contamination of ground water.

The Groseclose soil is suitable as a site for buildings and sanitary facilities. Low strength and instability are limitations on sites for local roads and streets. These limitations can be overcome by strengthening or replacing the base material. The restricted permeability is a limitation on sites for septic tank absorption fields. It can be overcome by enlarging the absorption area. The shrink-swell potential is a limitation on sites for buildings. It can be overcome by strengthening the foundation.

The land capability classification is IIIe.

4D—Chiswell-Groseclose-Litz complex, 15 to 30 percent slopes. These soils are moderately steep and steep and are well drained. They are on upland side slopes in the Great Valley. The shallow Chiswell, very deep Groseclose, and moderately deep Litz soils occur as areas so closely intermingled that mapping them separately was not practical. This map unit is about 35 percent Chiswell soil, 25 percent Groseclose soil, 20 percent Litz soil, and 20 percent included soils. Areas range from 5 to 500 acres in size.

A typical profile of the Chiswell soil has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 3 inches, dark reddish brown very channery silt loam

Subsoil:
3 to 13 inches, reddish brown very channery silt loam

Bedrock:
13 to 72 inches, mottled yellowish red and reddish brown, weathered shale

A typical profile of the Groseclose soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown silt loam

Subsoil:
8 to 28 inches, strong brown clay
28 to 42 inches, strong brown clay mottled with reddish yellow

Substratum:
42 to 72 inches, mottled reddish yellow and red silt loam

A typical profile of the Litz soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, reddish brown channery silt loam

Subsoil:
7 to 15 inches, reddish brown very channery silt loam and yellowish red silty clay loam

Substratum:
15 to 35 inches, reddish brown very channery silt loam

Bedrock:
35 inches, red shale

Austinville, Clubcaf, and Timberville soils are included in areas of this map unit. Austinville soils are in landscape positions similar to those of the Chiswell, Groseclose, and Litz soils. Clubcaf soils are on flood plains in narrow, V-shaped valleys. Timberville soils are on concave upland side slopes and along drainageways. Soils that have a stony surface layer are included in some areas.

The Chiswell, Groseclose, and Litz soils formed in material weathered from thinly bedded shale, limestone, and sandstone, which dip at angles of a few degrees to 90 degrees. Because the parent materials weather at different rates, the depth to bedrock and the texture vary within very short distances.

Properties of the Chiswell soil—

Permeability: Moderate
Available water capacity: Very low
Organic matter content: Low
Reaction: Extremely acid to moderately acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Poor
Depth to the seasonal high water table: More than 72 inches
Root zone: 10 to 20 inches
Depth to bedrock: 10 to 20 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

Properties of the Groseclose soil—

Permeability: Slow
Available water capacity: Moderate
Organic matter content: Low
Reaction: Extremely acid to strongly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Potential for frost action: Moderate

Properties of the Litz soil—

Permeability: Moderate
Available water capacity: Low
Organic matter content: Low
Reaction: Very strongly acid or strongly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Poor
Depth to the seasonal high water table: More than 72 inches
Root zone: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

These soils are used mainly as pasture or woodland. A few areas are used for hay or cultivated crops.

These soils are generally unsuited to cultivated crops. The erosion potential is a management concern. Runoff and erosion can be controlled by contour

farming, stripcropping, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

These soils are poorly suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

These soils are poorly suited to grasses and legumes for pasture. If the soils are used as pasture, grasses and legumes should cover a minimum of 70 percent of the surface. This plant cover is needed to control runoff and erosion. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The soils are droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of the Chiswell and Litz soils for northern red oak is moderately high on north and east exposures and moderate on south and west exposures. The estimated annual production of wood is 285 board feet per acre on north and east exposures and 250 board feet per acre on south and west exposures. The potential productivity of the Groseclose soil for northern red oak is moderately high. The estimated annual production of wood is 360 board feet per acre on north and east exposures and 285 board feet per acre on south and west exposures. Timber can be easily managed on these soils. Windthrow and seedling mortality are problems on the Chiswell soil. The slope restricts the use of logging equipment. The erosion potential is a management concern, especially along logging roads and skid trails.

Community development is limited by the slope, the depth to bedrock, low strength, restricted permeability, seepage, and the shrink-swell potential. These soils are poorly suited to building site development and sanitary facilities.

The land capability classification is IVe.

4E—Chiswell-Groseclose-Litz complex, 30 to 60 percent slopes. These soils are steep and very steep and are well drained. They are on upland side slopes in the Great Valley. The shallow Chiswell, very deep Groseclose, and moderately deep Litz soils occur as areas so closely intermingled that mapping them separately was not practical. This map unit is about 35 percent Chiswell soil, 25 percent Groseclose soil, 20 percent Litz soil, and 20 percent included soils. Areas range from 5 to 500 acres in size.

A typical profile of the Chiswell soil has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 3 inches, dark reddish brown very channery silt loam

Subsoil:
3 to 13 inches, reddish brown very channery silt loam

Bedrock:
13 to 72 inches, mottled yellowish red and reddish brown, weathered shale

A typical profile of the Groseclose soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown silt loam

Subsoil:
8 to 28 inches, strong brown clay
28 to 42 inches, strong brown clay mottled with reddish yellow

Substratum:
42 to 72 inches, mottled reddish yellow and red silt loam

A typical profile of the Litz soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, reddish brown channery silt loam

Subsoil:
7 to 15 inches, reddish brown very channery silt loam and yellowish red silty clay loam

Substratum:
15 to 35 inches, reddish brown very channery silt loam

Bedrock:
35 inches, red shale

Austinville, Clubcaf, and Timberville soils are included in areas of this map unit. Austinville soils are in landscape positions similar to those of the Chiswell, Groseclose, and Litz soils. Clubcaf soils are on flood plains in narrow, V-shaped valleys. Timberville soils are on concave upland side slopes and along

drainageways. Soils that have a stony surface layer are included in some areas.

The Chiswell, Groseclose, and Litz soils formed in material weathered from thinly bedded shale, limestone, and sandstone, which dip at angles of a few degrees to 90 degrees (fig. 6). Because the parent materials weather at different rates, the depth to bedrock and the texture vary within very short distances.

Properties of the Chiswell soil—

Permeability: Moderate
Available water capacity: Very low
Organic matter content: Low
Reaction: Extremely acid to moderately acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Poor
Depth to the seasonal high water table: More than 72 inches
Root zone: 10 to 20 inches
Depth to bedrock: 10 to 20 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

Properties of the Groseclose soil—

Permeability: Slow
Available water capacity: Moderate
Organic matter content: Low
Reaction: Extremely acid to strongly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Potential for frost action: Moderate

Properties of the Litz soil—

Permeability: Moderate
Available water capacity: Low
Organic matter content: Low
Reaction: Very strongly acid or strongly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Poor
Depth to the seasonal high water table: More than 72 inches
Root zone: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

These soils are used mainly as pasture or woodland. They are generally unsuited to cultivated crops. Crop production is limited by the slope. The erosion potential is a management concern.

These soils are generally unsuited to grasses and legumes for pasture. If the soils are used as pasture, grasses and legumes should cover a minimum of 70 percent of the surface. This plant cover is needed to control runoff and erosion. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The soils are droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of the Chiswell and Litz soils for northern red oak is moderately high on north and east exposures and moderate on south and west exposures. The estimated annual production of wood is 285 board feet per acre on north and east exposures and 250 board feet per acre on south and west exposures. The potential productivity of the Groseclose soil for northern red oak is moderately high. The estimated annual production of wood is 360 board feet per acre on north and east exposures and 285 board feet per acre on south and west exposures. Windthrow and seedling mortality are problems on the Chiswell soil. The slope restricts the use of logging equipment. The erosion potential is a management concern, especially along logging roads and skid trails.

Community development is limited by the depth to bedrock, the slope, low strength, restricted permeability, and the shrink-swell potential. These soils are poorly suited to building site development and sanitary facilities.

The land capability classification is VIIe.

5A—Clubcaf silt loam, 0 to 3 percent slopes, frequently flooded. This soil is nearly level, very deep, and poorly drained. It is on flood plains in the Great Valley. It is saturated during winter and spring and is flooded for long periods. Areas range from 5 to 50 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, dark brown silt loam mottled with dark grayish brown and yellowish red

Subsoil:
7 to 22 inches, very dark gray silt loam mottled with yellowish red

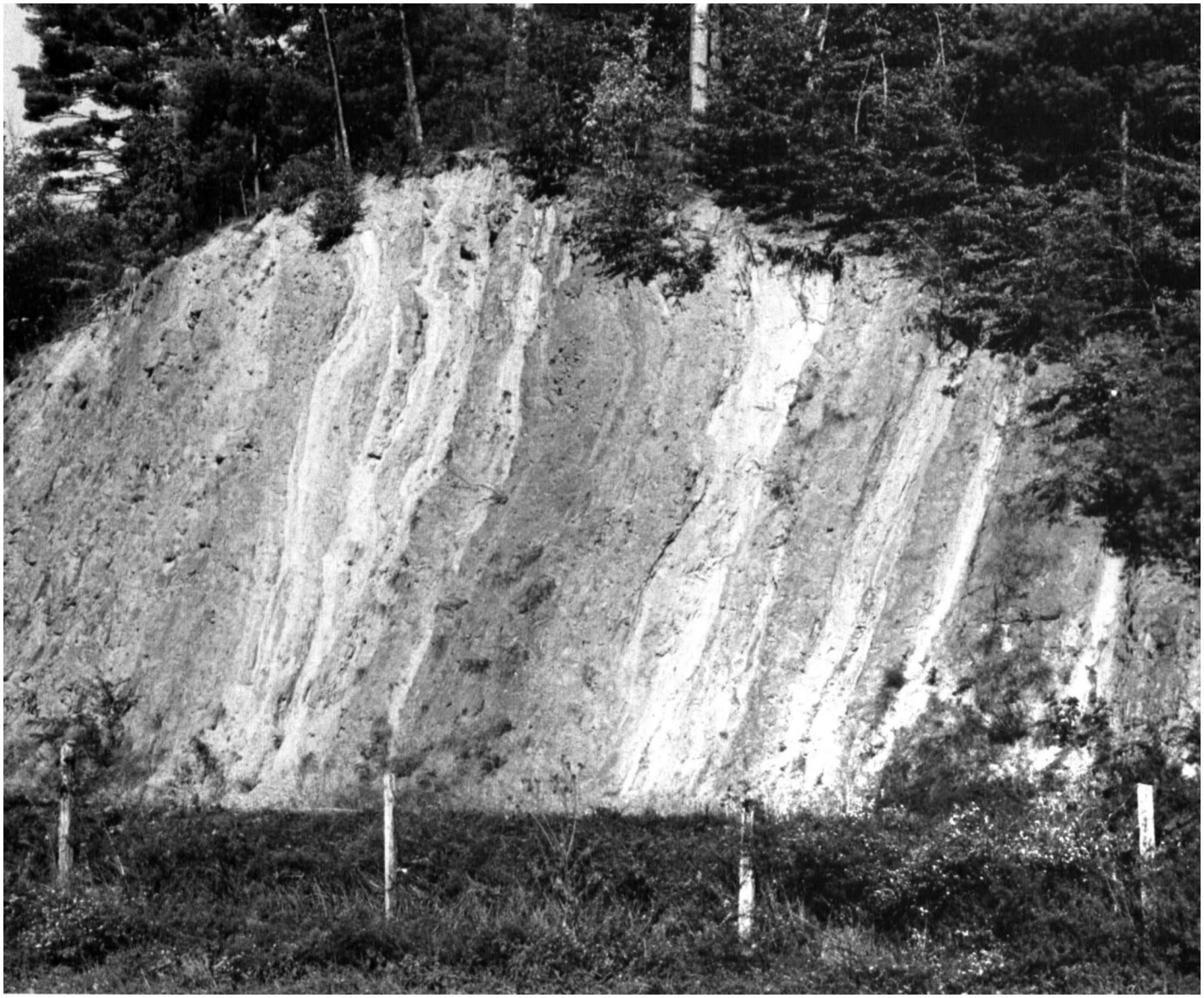

Figure 6.—An area of Chiswell, Groseclose, and Litz soils where thinly bedded shale, limestone, and sandstone dip at an angle of nearly 90 degrees.

22 to 41 inches, very dark gray silt loam mottled with yellowish red

Substratum:

41 to 62 inches, very dark grayish brown silty clay loam mottled with brown

Chiswell, Litz, Sindion, Speedwell, and Wheeling soils are included in areas of this map unit. Chiswell and Litz soils are on upland side slopes. Sindion and Speedwell soils are on flood plains. Wheeling soils are on stream terraces. Soils that have a gravelly surface layer are included in some areas. Included soils make up about 20 percent of this unit.

Soil properties—

Permeability: Moderate
Available water capacity: High
Organic matter content: Moderate
Reaction: Moderately acid to mildly alkaline
Surface runoff: Very slow
Erosion potential: Low
Tilth: Fair

Depth to the seasonal high water table: 0 to 18 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Potential for frost action: High
Flooding: Frequent, long

This soil is used mainly as pasture. It is prime farmland in areas where it is drained and is protected from frequent flooding during the growing season.

This soil is suited to cultivated crops. Flooding and wetness damage crops and delay planting and harvesting. Small grain tends to lodge. Yields can be increased by applying fertilizer according to the results of soil tests. A starter fertilizer high in phosphorus and low in potassium and nitrogen should be applied in areas used for corn. Plant tissue tests should be used to monitor micronutrient requirements. Plant nutrient management should include animal manure analysis and utilization. Tilling when the soil is wet results in the formation of clods and an undesirable seedbed and thus hinders seed germination.

This soil is well suited to grasses and legumes for hay. Alfalfa and red clover stands are short lived because of wetness. Hayland management includes crop rotations and conventional and no-till planting. Yields can be increased by applying fertilizer according to the results of soil tests.

This soil is well suited to grasses and white clover for pasture. Red clover stands are short lived because of wetness. Pasture management includes rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying fertilizer according to the results of soil tests.

The potential productivity of this soil for pin oak is moderately high. The estimated annual production of wood is 430 board feet per acre. Flooding and wetness are management concerns.

Community development is limited by flooding, wetness, and low strength. This soil is poorly suited to building site development and sanitary facilities.

The land capability classification is VIw.

6C—Dekalb channery sandy loam, 7 to 15 percent slopes. This soil is sloping, moderately deep, and well drained. It is on upland summits, shoulder slopes, and side slopes in the Allegheny Mountains, on Lick Mountain, and in the Blue Ridge province. Areas range from 5 to 50 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Organic layer:
1 inch to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 3 inches, very dark grayish brown channery sandy loam

Subsurface layer:
3 to 9 inches, light yellowish brown channery sandy loam

Subsoil:
9 to 28 inches, yellowish brown very channery sandy loam

Substratum:
28 to 35 inches, yellowish brown extremely channery sandy loam

Bedrock:
35 inches, fractured sandstone

Lily, Jefferson, Matneflat, and Sylvatus soils are included in areas of this map unit. Lily and Sylvatus soils are in landscape positions similar to those of the Dekalb soil. Jefferson and Matneflat soils are on the lower colluvial side slopes, foot slopes, fans, and benches. Soils that have a stony surface layer are included in some areas. Included soils make up about 25 percent of this unit.

Soil properties—

Permeability: Rapid
Available water capacity: Low
Organic matter content: Moderate
Reaction: Extremely acid to strongly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Fair
Depth to the seasonal high water table: More than 72 inches
Root zone: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Potential for frost action: Low

This soil is used mainly as woodland. A few areas are used for cultivated crops or for pasture.

This soil is suited to cultivated crops. The depth to bedrock and droughtiness are limitations. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, stripcropping, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming.

Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The soil is droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of this soil for northern red oak is moderate. The estimated annual production of wood is 220 board feet per acre. Timber can be easily managed on this soil.

Community development is limited by the depth to bedrock, the slope, and the rapid permeability. The slope and the depth to bedrock are limitations on sites for buildings. They can be overcome by properly designing the buildings. The depth to bedrock and the rapid permeability, which can result in the contamination of ground water, are limitations on sites for septic tank absorption fields. Special design is needed to overcome these limitations. The slope and the depth to bedrock are limitations on sites for local roads and streets.

The land capability classification is IIIe.

6D—Dekalb channery sandy loam, 15 to 35 percent slopes. This soil is moderately steep and steep, moderately deep, and well drained. It is on upland side slopes in the Allegheny Mountains, on Lick Mountain, and in the Blue Ridge province. Areas range from 5 to 100 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Organic layer:
1 inch to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 3 inches, very dark grayish brown channery sandy loam

Subsurface layer:
3 to 9 inches, light yellowish brown channery sandy loam

Subsoil:
9 to 28 inches, yellowish brown very channery sandy loam

Substratum:
28 to 35 inches, yellowish brown extremely channery sandy loam

Bedrock:
35 inches, fractured sandstone

Lily, Jefferson, Matneflat, and Sylvatus soils are included in areas of this map unit. Lily and Sylvatus soils are in landscape positions similar to those of the Dekalb soil. Jefferson and Matneflat soils are on the lower colluvial side slopes, foot slopes, fans, and benches. Soils that have a stony surface layer are included in some areas. Included soils make up about 25 percent of this unit.

Soil properties—

Permeability: Rapid
Available water capacity: Low
Organic matter content: Moderate
Reaction: Extremely acid to strongly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Fair
Depth to the seasonal high water table: More than 72 inches
Root zone: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Potential for frost action: Low

This soil is used mainly as woodland. A few areas are used for cultivated crops or for pasture.

This soil is generally unsuited to cultivated crops. Crop production is limited by the slope, droughtiness, and rock fragments. The erosion potential is a management concern.

This soil is poorly suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is poorly suited to grasses and legumes for pasture. Droughtiness and the erosion potential are limitations. If the soil is used as pasture, grasses and legumes should cover a minimum of 70 percent of the surface. This plant cover is needed to control runoff and erosion. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The soil is droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of this soil for northern red oak is moderate. The estimated annual production of wood is 220 board feet per acre on north and east

exposures and 180 board feet per acre on south and west exposures. Timber can be easily managed on this soil. The slope restricts the use of logging equipment. The erosion potential is a management concern, especially along logging roads and skid trails.

Community development is limited by the slope, the depth to bedrock, and the rapid permeability. This soil is poorly suited to building site development and sanitary facilities.

The land capability classification is VIe.

6E—Dekalb channery sandy loam, 35 to 65 percent slopes. This soil is steep and very steep, moderately deep, and well drained. It is on upland side slopes in the Allegheny Mountains, on Lick Mountain, and in the Blue Ridge province. Areas range from 5 to 200 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Organic layer:
1 inch to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 3 inches, very dark grayish brown channery sandy loam

Subsurface layer:
3 to 9 inches, light yellowish brown channery sandy loam

Subsoil:
9 to 28 inches, yellowish brown very channery sandy loam

Substratum:
28 to 35 inches, yellowish brown extremely channery sandy loam

Bedrock:
35 inches, fractured sandstone

Lily, Jefferson, Matneflat, and Sylvatus soils are included in areas of this map unit. Lily and Sylvatus soils are in landscape positions similar to those of the Dekalb soil. Jefferson and Matneflat soils are on the lower colluvial side slopes, foot slopes, fans, and benches. Soils that have a stony surface layer are included in some areas. Included soils make up about 25 percent of this unit.

Soil properties—

Permeability: Rapid
Available water capacity: Low
Organic matter content: Moderate
Reaction: Extremely acid to strongly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Fair
Depth to the seasonal high water table: More than 72 inches
Root zone: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Potential for frost action: Low

This soil is used mainly as woodland. It is generally unsuited to cultivated crops. Crop production is limited by the slope, droughtiness, and rock fragments. The erosion potential is a management concern.

This soil is generally unsuited to grasses and legumes for pasture. If the soil is used as pasture, grasses and legumes should cover a minimum of 70 percent of the surface. This plant cover is needed to control runoff and erosion. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The soil is droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of this soil for northern red oak is moderate. The estimated annual production of wood is 220 board feet per acre on north and east exposures and 180 board feet per acre on south and west exposures. The slope restricts the use of logging equipment. The erosion potential is a management concern, especially along logging roads and skid trails.

Community development is limited by the depth to bedrock, the slope, and the rapid permeability. This soil is poorly suited to building site development and sanitary facilities.

The land capability classification is VIIe.

7B—Derroc cobbly sandy loam, 0 to 5 percent slopes, occasionally flooded. This soil is nearly level and gently sloping, very deep, and well drained. It is on flood plains in the Great Valley. It is flooded for brief periods. Areas range from 5 to 50 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 6 inches, dark brown cobbly sandy loam

Subsoil:
6 to 28 inches, strong brown very cobbly sandy loam

Substratum:
28 to 61 inches, dark brown extremely cobbly sandy loam

Ingledove, Jefferson, and Lily soils are included in areas of this map unit. Ingledove soils are on stream terraces. Jefferson soils are on upland foot slopes. Lily soils are on upland side slopes. Included soils make up about 20 percent of this unit.

Soil properties—

Permeability: Moderately rapid
Available water capacity: Low
Organic matter content: Moderate
Reaction: Moderately acid to neutral
Surface runoff: Slow
Erosion potential: Low
Tilth: Poor
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Potential for frost action: Moderate
Flooding: Occasional, brief

This soil is used mainly as woodland or pasture. A few areas are used for cultivated crops or for hay.

This soil is suited to cultivated crops. Rock fragments interfere with cultivation. Flooding damages the crops and delays planting and harvesting. The soil is droughty. Yields can be increased by applying fertilizer according to the results of soil tests. A starter fertilizer high in phosphorus and low in potassium and nitrogen should be applied in areas used for corn. Plant tissue tests should be used to monitor micronutrient requirements. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for hay. Hayland management includes crop rotations and conventional and no-till planting. Yields can be increased by applying fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying fertilizer according to the results of soil tests. The soil is droughty. Drought-tolerant forage species, such as fescue and red clover, should be selected for planting.

The potential productivity of this soil for northern red oak is moderately high. The estimated annual production of wood is 280 board feet per acre. Timber can be easily managed on this soil.

Community development is limited by flooding, the moderately rapid permeability, and large stones. This soil is poorly suited to building site development and sanitary facilities.

The land capability classification is IIIs.

8E—Drypond-Rock outcrop complex, 10 to 65 percent slopes. This map unit is on upland side slopes in the Allegheny Mountains, on Sand Mountain, and in the Blue Ridge province. The Drypond soil is sloping to very steep, shallow, and excessively drained. This soil and the Rock outcrop occur as areas so intermingled that mapping them separately was not practical. Stones more than 10 inches in diameter are less than 25 feet apart on the surface. This unit is about 50 percent Drypond soil, 25 percent Rock outcrop, and 25 percent included soils.

A typical profile of the Drypond soil has the following sequence of layers, textures, and colors—

Organic layer:
4 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 2 inches, very dark grayish brown very gravelly sandy loam

Subsoil:
2 to 14 inches, yellowish brown very gravelly sandy loam

Substratum:
14 to 18 inches, brown very gravelly sandy loam

Bedrock:
18 inches, quartzite

Rock outcrops are sandstone. They are approximately 10 to 30 feet apart and cover about 25 percent of the surface.

Lily, Matneflat, and Sylvatus soils are included in areas of this map unit. Lily and Sylvatus soils are in landscape positions similar to those of the Drypond soil. Matneflat soils are on upland colluvial side slopes, foot slopes, and benches. Soils that have a stony surface layer are included in some areas.

Properties of the Drypond soil—

Permeability: Rapid
Available water capacity: Very low
Organic matter content: Low
Reaction: Extremely acid or very strongly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Poor
Depth to the seasonal high water table: More than 72 inches
Root zone: 10 to 20 inches

Depth to bedrock: 10 to 20 inches
Shrink-swell potential: Low
Potential for frost action: Low

This map unit is used as woodland. A few areas are used for cultivated crops or for pasture.

This map unit is generally unsuited to cultivated crops. Crop production is limited by the Rock outcrop, the slope, and droughtiness. The erosion potential is a management concern.

This map unit is generally unsuited to grasses and legumes for pasture. If the unit is used as pasture, grasses and legumes should cover a minimum of 70 percent of the surface. This plant cover is needed to control runoff and erosion. The Rock outcrop, the slope, and droughtiness are limitations. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The Drypond soil is droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of the Drypond soil for northern red oak is moderate. The estimated annual production of wood is 220 board feet per acre on north and east exposures and 180 board feet per acre on south and west exposures. The slope restricts the use of logging equipment. The erosion potential is a management concern, especially along logging roads and skid trails.

Community development is limited by the slope and the depth to bedrock. This unit is poorly suited to building site development and sanitary facilities.

The land capability classification is VIIe.

9A—Evansham silty clay loam, 0 to 2 percent slopes, frequently flooded. This soil is nearly level, very deep, and poorly drained. It is on flood plains in the Great Valley. It is ponded or saturated during winter and spring and is flooded for long periods. Areas range from 5 to 100 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, black silty clay loam

Subsurface layer:
7 to 13 inches, black silty clay mottled with yellowish brown
13 to 22 inches, very dark gray silty clay loam mottled with brownish yellow

Substratum:
22 to 63 inches, gray clay loam mottled with light olive brown
63 to 75 inches, dark gray loam

Gullion, Nomberville, and Pagebrook soils are included in areas of this map unit. These soils are on flood plains. They make up about 15 percent of this unit.

Soil properties—

Permeability: Slow
Available water capacity: Moderate
Organic matter content: High
Reaction: Slightly acid to mildly alkaline
Surface runoff: Very slow
Erosion potential: Low
Tilth: Poor
Depth to the seasonal high water table: 0 to 6 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Very high
Potential for frost action: High
Flooding: Frequent, long

This soil is used mainly for cultivated crops or for pasture. It is poorly suited to cultivated crops. Flooding and wetness damage crops and delay planting and harvesting. Small grain tends to lodge. Yields can be increased by applying fertilizer according to the results of soil tests. A starter fertilizer high in phosphorus and low in potassium and nitrogen should be applied in areas used for corn. Plant tissue tests should be used to monitor micronutrient requirements. Plant nutrient management should include animal manure analysis and utilization. Tilling when the soil is wet results in the formation of clods and an undesirable seedbed and thus hinders seed germination.

This soil is suited to grasses and legumes for hay. Alfalfa and red clover stands are short lived because of wetness. Hayland management includes crop rotations and conventional and no-till planting. Yields can be increased by applying fertilizer according to the results of soil tests.

This soil is suited to grasses and white clover for pasture. Red clover stands are short lived because of wetness. Pasture management includes rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying fertilizer according to the results of soil tests.

The potential productivity of this soil for sweetgum is moderately high. The estimated annual production of wood is 280 board feet per acre. Flooding and wetness are management concerns.

Community development is limited by flooding, wetness, low strength, the shrink-swell potential, and the potential for frost action. This soil is poorly suited to building site development and sanitary facilities.

The land capability classification is VIw in undrained areas and IIw in drained areas.

10B—Frederick silt loam, 2 to 7 percent slopes. This soil is gently sloping, very deep, and well drained. It is on broad upland summits in the Great Valley. Areas range from about 5 to 150 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, strong brown silt loam

Subsoil:
7 to 27 inches, yellowish red clay
27 to 57 inches, yellowish red clay mottled with reddish yellow
57 to 72 inches, yellowish red clay mottled with reddish yellow and dark red

Marbie, Timberville, and Wyrick soils are included in areas of this map unit. These soils are in upland depressions, on concave foot slopes, and in drainageways. Rock outcrops, sinkholes, and soils that have a gravelly surface layer are included in some areas. Included areas make up about 20 percent of this unit.

Soil properties—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Low
Reaction: Very strongly acid to moderately acid
Surface runoff: Medium
Erosion potential: Medium
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Potential for frost action: Moderate

This soil is used mainly for cultivated crops, hay, or pasture (fig. 7). It is prime farmland.

This soil is well suited to cultivated crops, especially corn, vegetables, and small grain. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, no-till planting, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests.

The potential productivity of this soil for northern red oak is moderately high. The estimated annual production of wood is 285 board feet per acre. Timber can be easily managed on this soil.

Community development is limited by low strength, the shrink-swell potential, and restricted permeability. This soil is suited to building site development and sanitary facilities. Low strength is a limitation on sites for local roads and streets. It can be overcome by strengthening or replacing the base material. The restricted permeability is a limitation on sites for septic tank absorption fields. It can be overcome by enlarging the absorption area. The shrink-swell potential is a limitation on sites for buildings. It can be overcome by strengthening the foundation.

The land capability classification is IIe.

10C—Frederick silt loam, 7 to 15 percent slopes. This soil is sloping, very deep, and well drained. It is on broad upland summits, shoulder slopes, and side slopes in the Great Valley. Areas range from 5 to 300 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, strong brown silt loam

Subsoil:
7 to 27 inches, yellowish red clay
27 to 57 inches, yellowish red clay mottled with reddish yellow
57 to 72 inches, yellowish red clay mottled with reddish yellow and dark red

Marbie, Timberville, and Wyrick soils are included in areas of this map unit. These soils are in upland depressions, on concave foot slopes, and in drainageways. Rock outcrops, sinkholes, and soils that have a gravelly surface layer are included in some areas. Included areas make up about 20 percent of this unit.

Soil properties—

Permeability: Moderate

Figure 7.—Harvesting hay on Frederick silt loam, 2 to 7 percent slopes.

Available water capacity: Moderate
Organic matter content: Low
Reaction: Very strongly acid to moderately acid
Surface runoff: Medium
Erosion potential: Medium
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Potential for frost action: Moderate

This soil is used mainly for cultivated crops, hay, or pasture (fig. 8). It is suited to cultivated crops, especially corn, vegetables, and small grain. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, no-till planting, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests.

The potential productivity of this soil for northern red oak is moderately high. The estimated annual

production of wood is 285 board feet per acre. Timber can be easily managed on this soil.

Community development is limited by the slope, low strength, the shrink-swell potential, and restricted permeability. This soil is suited to building site development and sanitary facilities. Low strength is a limitation on sites for local roads and streets. It can be overcome by strengthening or replacing the base material. The slope and the restricted permeability are limitations on sites for septic tank absorption fields. These limitations can be overcome by enlarging the absorption area and by installing the distribution lines on the contour. The slope and the shrink-swell potential are limitations on sites for buildings. They can be overcome by properly designing the buildings and by strengthening the foundation.

The land capability classification is IIIe.

10D—Frederick silt loam, 15 to 30 percent slopes. This soil is moderately steep and steep, very deep, and well drained. It is on upland side slopes in the Great Valley. Areas range from 5 to 300 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:

0 to 7 inches, strong brown silt loam

Subsoil:

7 to 27 inches, yellowish red clay

Figure 8.—A pastured area of Frederick silt loam, 7 to 15 percent slopes. This soil is well suited to grasses and legumes for hay and pasture.

27 to 57 inches, yellowish red clay mottled with reddish yellow
57 to 72 inches, yellowish red clay mottled with reddish yellow and dark red

Marbie, Timberville, and Wyrick soils are included in areas of this map unit. These soils are in upland depressions, on concave foot slopes, and in drainageways. Rock outcrops, sinkholes, and soils that have a gravelly surface layer are included in some areas. Included areas make up about 20 percent of this unit.

Soil properties—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Low
Reaction: Very strongly acid to moderately acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Potential for frost action: Moderate

This soil is used mainly for cultivated crops, hay, or pasture. It is poorly suited to cultivated crops. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, no-till planting, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests.

The potential productivity of this soil for northern red oak is moderately high on north and east exposures and moderate on south and west exposures. The estimated annual production of wood is 285 board feet per acre on north and east exposures and 270 board feet per acre on south and west exposures. The slope restricts the use of logging equipment. The erosion potential is a management concern, especially along logging roads and skid trails.

Community development is limited by the slope, low strength, the shrink-swell potential, and restricted permeability. This soil is poorly suited to building site development and sanitary facilities.

The land capability classification is IVe.

11A—Gullion loam, 0 to 3 percent slopes, occasionally flooded. This soil is nearly level, very deep, and moderately well drained. It is on flood plains in the Great Valley and is flooded for brief periods. Areas range from 10 to 200 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 10 inches, dark brown loam

Subsoil:
10 to 23 inches, dark brown clay loam
23 to 42 inches, dark yellowish brown clay loam mottled with brown

Substratum:
42 to 62 inches, dark gray clay loam

Botetourt, Evansham, and Nomberville soils are included in areas of this map unit. Botetourt soils are on stream terraces. Evansham and Nomberville soils are on flood plains. Soils that have a gravelly or cobbly surface layer are included in some areas. Included soils make up about 15 percent of this unit.

Soil properties—

Permeability: Moderate
Available water capacity: High
Organic matter content: Moderate
Reaction: Moderately acid to mildly alkaline
Surface runoff: Slow
Erosion potential: Low
Tilth: Good
Depth to the seasonal high water table: 18 to 36 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Potential for frost action: High
Flooding: Occasional, brief

This soil is used mainly for cultivated crops or for pasture. It is prime farmland.

This soil is well suited to cultivated crops, especially corn and small grain. Flooding damages the crops and delays planting and harvesting. Small grain tends to lodge. When the soil is wet, vehicular traffic can cause

compaction, which reduces crop yields. Yields can be increased by applying fertilizer according to the results of soil tests. A starter fertilizer high in phosphorus and low in potassium and nitrogen should be applied in areas used for corn. Plant tissue tests should be used to monitor micronutrient requirements. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for hay. Alfalfa and red clover stands are short lived because of wetness. Hayland management includes crop rotations and conventional and no-till planting. Yields can be increased by applying fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and white clover for pasture. Red clover stands are short lived because of wetness. Pasture management includes rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying fertilizer according to the results of soil tests.

The potential productivity of this soil for northern red oak is moderately high. The estimated annual production of wood is 360 board feet per acre. Wetness and flooding are management concerns.

Community development is limited by flooding, wetness, low strength, restricted permeability, and the potential for frost action. This soil is poorly suited to building site development and sanitary facilities.

The land capability classification is IIw.

12C—Hagerstown silt loam, 7 to 15 percent slopes, very rocky. This soil is sloping, deep, and well drained. It is on upland summits, shoulder slopes, and side slopes in the Great Valley. This map unit is 2 to 10 percent limestone rock outcrop. Areas range from 5 to 50 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, dark yellowish brown silt loam

Subsoil:
7 to 33 inches, strong brown clay mottled with reddish brown and yellow
33 to 42 inches, yellowish red clay mottled with brownish yellow

Substratum:
42 to 55 inches, strong brown clay mottled with brownish yellow and yellowish red

Bedrock:
55 inches, interbedded limestone and calcareous shale

Marbie, Timberville, Wurno, and Wyrick soils are included in areas of this map unit. Marbie, Timberville, and Wyrick soils are along intermittent drainageways, in upland depressions, and on concave foot slopes. Wurno soils are in landscape positions similar to those of the Hagerstown soil. Soils that are shallower to bedrock than the Hagerstown soil and soils that have a gravelly surface layer are included in some areas. Included soils make up about 20 percent of this unit.

Soil properties—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Moderate
Reaction: Strongly acid to slightly acid in the surface layer and in the upper part of the subsoil and strongly acid to neutral in the lower part of the subsoil and in the substratum
Surface runoff: Rapid
Erosion potential: Medium
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: 40 to 60 inches
Depth to bedrock: 40 to 60 inches
Shrink-swell potential: Moderate
Potential for frost action: Moderate

This soil is used as pasture, hay, or woodland. It is poorly suited to cultivated crops. The rock outcrop limits the use of machinery. The erosion potential is a management concern.

This soil is suited to grasses and legumes for hay. The rock outcrop limits the use of machinery. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is suited to grasses and legumes for pasture. The rock outcrop limits the use of machinery. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests.

The potential productivity of this soil for northern red oak is moderately high. The estimated annual production of wood is 360 board feet per acre. Timber can be easily managed on this soil.

Community development is limited by the slope, the depth to bedrock, restricted permeability, low strength, and the shrink-swell potential. This soil is suited to building site development and sanitary facilities. Low

strength is a limitation affecting local roads and streets. It can be overcome by strengthening or replacing the base material. The restricted permeability, the depth to bedrock, and the slope are limitations on sites for septic tank absorption fields. These limitations can be overcome by enlarging the absorption area and by specially designing the fields and using proper installation procedures. The depth to bedrock, the slope, and the shrink-swell potential are limitations on sites for buildings. They can be overcome by properly designing the buildings and by strengthening the foundation.

The land capability classification is VIs.

12D—Hagerstown silt loam, 15 to 30 percent slopes, very rocky. This soil is moderately steep and steep, deep, and well drained. It is on upland side slopes in the Great Valley. This map unit is 2 to 10 percent limestone rock outcrop. Areas range from 5 to 75 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, dark yellowish brown silt loam

Subsoil:
7 to 33 inches, strong brown clay mottled with reddish brown and yellow
33 to 42 inches, yellowish red clay mottled with brownish yellow

Substratum:
42 to 55 inches, strong brown clay mottled with brownish yellow and yellowish red

Bedrock:
55 inches, interbedded limestone and calcareous shale

Marbie, Timberville, Wurno, and Wyrick soils are included in areas of this map unit. Marbie, Timberville, and Wyrick soils are along intermittent drainageways, in upland depressions, and on concave foot slopes. Wurno soils are in landscape positions similar to those of the Hagerstown soil. Soils that are shallower to bedrock than the Hagerstown soil and soils that have a gravelly surface layer are included in some areas. Included soils make up about 20 percent of this unit.

Soil properties—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Moderate
Reaction: Strongly acid to slightly acid in the surface layer and in the upper part of the subsoil and strongly acid to neutral in the lower part of the subsoil and in the substratum
Surface runoff: Rapid
Erosion potential: High
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: 40 to 60 inches
Depth to bedrock: 40 to 60 inches
Shrink-swell potential: Moderate
Potential for frost action: Moderate

This soil is used for pasture (fig. 9), hay, or woodland. It is generally unsuited to cultivated crops. The rock outcrop limits the use of machinery. The erosion potential is a management concern.

This soil is poorly suited to grasses and legumes for hay. The rock outcrop limits the use of machinery. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is suited to grasses and legumes for pasture. The rock outcrop limits the use of machinery. If the soil is used as pasture, grasses and legumes should cover a minimum of 70 percent of the surface. This plant cover is needed to control runoff and erosion. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests.

The potential productivity of this soil for northern red oak is moderately high. The estimated annual production of wood is 360 board feet per acre on north and east exposures and 285 board feet per acre on south and west exposures. The erosion potential is a management concern, especially along logging roads and skid trails. Timber can be easily managed on this soil.

Community development is limited by the slope, the rock outcrop, the depth to bedrock, low strength, the shrink-swell potential, and restricted permeability. This soil is poorly suited to building site development and sanitary facilities.

The land capability classification is VIs.

13E—Hagerstown-Rock outcrop complex, 10 to 45 percent slopes. This map unit is on upland side slopes in the Great Valley. The Hagerstown soil is sloping to steep, deep, and well drained. This soil and the Rock outcrop occur as areas so intermingled that mapping them separately was not practical. This unit is about 45

Figure 9.—A pastured area of Hagerstown silt loam, 15 to 30 percent slopes, very rocky. This soil is suited to grasses and legumes for pasture.

percent Hagerstown soil, 30 percent Rock outcrop, and 25 percent included soils. Areas range from 5 to 500 acres in size.

A typical profile of the Hagerstown soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, dark yellowish brown silt loam

Subsoil:
7 to 33 inches, strong brown clay mottled with reddish brown and yellow
33 to 42 inches, yellowish red clay mottled with brownish yellow

Substratum:
42 to 55 inches, strong brown clay mottled with brownish yellow and yellowish red

Bedrock:
55 inches, interbedded limestone and calcareous shale

Rock outcrops are limestone. They are about 10 to 30 feet apart.

Marbie, Timberville, Wurno, and Wyrick soils are included in areas of this map unit. Marbie, Timberville, and Wyrick soils are along intermittent drainageways, in upland depressions, and on concave foot slopes. Wurno

soils are in landscape positions similar to those of the Hagerstown soil.

Properties of the Hagerstown soil—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Moderate
Reaction: Strongly acid to slightly acid in the surface layer and in the upper part of the subsoil and strongly acid to neutral in the lower part of the subsoil and in the substratum
Surface runoff: Rapid
Erosion potential: High
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: 40 to 60 inches
Depth to bedrock: 40 to 60 inches
Shrink-swell potential: Moderate
Potential for frost action: Moderate

This map unit is used mainly as pasture or woodland. It is generally unsuited to cultivated crops. Crop production is limited by the Rock outcrop and the slope. The erosion potential is a management concern.

This map unit is generally unsuited to grasses and legumes for pasture. If the unit is used as pasture, grasses and legumes should cover a minimum of 70 percent of the surface. This plant cover is needed to control runoff and erosion. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The Hagerstown soil is droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of the Hagerstown soil for northern red oak is moderately high. The estimated annual production of wood is 360 board feet per acre on north and east exposures and 285 board feet per acre on south and west exposures. The slope restricts the use of logging equipment. The erosion potential is a management concern, especially along logging roads and skid trails.

Community development is limited by the Rock outcrop, the slope, and the depth to bedrock. This unit is poorly suited to building site development and sanitary facilities.

The land capability classification is VIIs.

14B—Hagerstown-Wurno complex, 2 to 7 percent slopes. These soils are gently sloping and well drained. They are on upland summits in the Great Valley. The deep Hagerstown and moderately deep Wurno soils occur as areas so closely intermingled that mapping them separately was not practical. This map unit is about 50 percent Hagerstown soil, 30 percent Wurno soil, and 20 percent included soils. Areas range from 5 to 35 acres in size.

A typical profile of the Hagerstown soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, dark yellowish brown silt loam

Subsoil:
7 to 33 inches, strong brown clay mottled with reddish brown and yellow
33 to 42 inches, yellowish red clay mottled with brownish yellow

Substratum:
42 to 55 inches, strong brown clay mottled with brownish yellow and yellowish red

Bedrock:
55 inches, interbedded limestone and calcareous shale

A typical profile of the Wurno soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 6 inches, dark grayish brown channery silt loam

Subsoil:
6 to 11 inches, brown channery silt loam mottled with dark brown
11 to 16 inches, light yellowish brown extremely channery silt loam

Substratum:
16 to 25 inches, strong brown extremely channery loam

Bedrock:
25 to 32 inches, strong brown, weathered shale
32 inches, interbedded limestone and calcareous shale

Marbie, Timberville, and Wyrick soils are included in areas of this map unit. These soils are along intermittent drainageways, in upland depressions, and on concave foot slopes. Rock outcrops, soils that are shallower to bedrock than the Hagerstown and Wurno soils, and soils that have a gravelly surface layer are included in some areas.

Properties of the Hagerstown soil—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Moderate
Reaction: Strongly acid to slightly acid in the surface

layer and in the upper part of the subsoil and strongly acid to neutral in the lower part of the subsoil and in the substratum
Surface runoff: Medium
Erosion potential: Medium
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: 40 to 60 inches
Depth to bedrock: 40 to 60 inches
Shrink-swell potential: Moderate
Potential for frost action: Moderate

Properties of the Wurno soil—

Permeability: Moderate
Available water capacity: Very low
Organic matter content: Low
Reaction: Very strongly acid to mildly alkaline in the surface layer and subsoil and neutral or mildly alkaline in the substratum
Surface runoff: Medium
Erosion potential: Medium
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

These soils are used mainly for cultivated crops, hay, or pasture. They are prime farmland.

These soils are well suited to cultivated crops, especially vegetables, corn, and small grain. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, stripcropping, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

These soils are well suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

These soils are well suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The Wurno soil is droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of these soils for northern red oak is moderately high. The estimated annual production of wood is 360 board feet per acre on the Hagerstown soil and 280 board feet per acre on the Wurno soil. Timber can be easily managed on these soils.

Community development is limited on the Hagerstown soil by the depth to bedrock, restricted permeability, low strength, and the shrink-swell potential. This soil is suited to building site development and sanitary facilities. Low strength is a limitation on sites for local roads and streets. It can be overcome by strengthening or replacing the base material. The depth to bedrock and the restricted permeability are limitations on sites for septic tank absorption fields. These limitations can be overcome by enlarging the absorption area and by properly designing the absorption fields. The shrink-swell potential and the depth to bedrock are limitations on sites for buildings. They can be overcome by strengthening the foundation and by properly designing the buildings.

Community development is limited on the Wurno soil by the depth to bedrock. This soil is suited to building site development and sanitary facilities. The bedrock generally can be dug with track loaders. On sites for sanitary facilities, special design is needed to reduce the likelihood that ground water will be contaminated. On building sites the depth to bedrock can be overcome by properly designing the buildings.

The land capability classification is IIe.

14C—Hagerstown-Wurno complex, 7 to 15 percent slopes. These soils are sloping and well drained. They are on upland summits, shoulder slopes, and side slopes in the Great Valley. The deep Hagerstown and moderately deep Wurno soils occur as areas so closely intermingled that mapping them separately was not practical. This map unit is about 50 percent Hagerstown soil, 30 percent Wurno soil, and 20 percent included soils. Areas range from 5 to 35 acres in size.

A typical profile of the Hagerstown soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, dark yellowish brown silt loam

Subsoil:
7 to 33 inches, strong brown clay mottled with reddish brown and yellow
33 to 42 inches, yellowish red clay mottled with brownish yellow

Substratum:
42 to 55 inches, strong brown clay mottled with brownish yellow and yellowish red

Bedrock:
55 inches, interbedded limestone and calcareous shale

A typical profile of the Wurno soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 6 inches, dark grayish brown channery silt loam

Subsoil:
6 to 11 inches, brown channery silt loam mottled with dark brown
11 to 16 inches, light yellowish brown extremely channery silt loam

Substratum:
16 to 25 inches, strong brown extremely channery loam

Bedrock:
25 to 32 inches, strong brown, weathered shale
32 inches, interbedded limestone and calcareous shale

Marbie, Timberville, and Wyrick soils are included in areas of this map unit. These soils are along intermittent drainageways, in upland depressions, and on concave foot slopes. Rock outcrops, soils that are shallower to bedrock than the Hagerstown and Wurno soils, and soils that have a gravelly surface layer are included in some areas.

Properties of the Hagerstown soil—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Moderate
Reaction: Strongly acid to slightly acid in the surface layer and in the upper part of the subsoil and strongly acid to neutral in the lower part of the subsoil and in the substratum
Surface runoff: Rapid
Erosion potential: Medium
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: 40 to 60 inches
Depth to bedrock: 40 to 60 inches
Shrink-swell potential: Moderate
Potential for frost action: Moderate

Properties of the Wurno soil—

Permeability: Moderate
Available water capacity: Very low
Organic matter content: Low
Reaction: Very strongly acid to mildly alkaline in the surface layer and subsoil and neutral or mildly alkaline in the substratum
Surface runoff: Rapid
Erosion potential: Medium
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

These soils are used mainly for cultivated crops, hay, or pasture. They are suited to cultivated crops, especially vegetables, corn, and small grain. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, stripcropping, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

These soils are well suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

These soils are well suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The Wurno soil is droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of these soils for northern red oak is moderately high. The estimated annual production of wood is 360 board feet per acre on the Hagerstown soil and 280 board feet per acre on the Wurno soil. Timber can be easily managed on these soils.

Community development is limited on the Hagerstown soil by the slope, the depth to bedrock, restricted permeability, low strength, and the shrink-swell potential. This soil is suited to building site development and sanitary facilities. Low strength and instability are limitations on sites for local roads and streets. These limitations can be overcome by strengthening or replacing the base material. The depth

to bedrock, the restricted permeability, and the slope are limitations on sites for septic tank absorption fields. They can be overcome by properly designing the absorption fields. The depth to bedrock, the slope, and the shrink-swell potential are limitations on sites for buildings. These limitations can be overcome by properly designing the buildings and by strengthening the foundation.

Community development is limited on the Wurno soil by the depth to bedrock and the slope. This soil is suited to building site development and sanitary facilities. The bedrock generally can be dug with track loaders. The slope is a limitation on sites for local roads and streets. It can be overcome by building on the contour. The depth to bedrock and the slope are limitations on sites for sanitary facilities. These limitations can be overcome by installing the distribution lines on the contour and by designing the system so that ground water is less likely to be contaminated. The slope and the depth to bedrock are limitations on sites for buildings. They can be overcome by properly designing the buildings.

The land capability classification is IIIe.

14D—Hagerstown-Wurno complex, 15 to 30 percent slopes. These soils are moderately steep and steep and are well drained. They are on upland side slopes in the Great Valley. The deep Hagerstown and moderately deep Wurno soils occur as areas so closely intermingled that mapping them separately was not practical. This map unit is about 50 percent Hagerstown soil, 30 percent Wurno soil, and 20 percent included soils. Areas range from 5 to 35 acres in size.

A typical profile of the Hagerstown soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, dark yellowish brown silt loam

Subsoil:
7 to 33 inches, strong brown clay mottled with reddish brown and yellow
33 to 42 inches, yellowish red clay mottled with brownish yellow

Substratum:
42 to 55 inches, strong brown clay mottled with brownish yellow and yellowish red

Bedrock:
55 inches, interbedded limestone and calcareous shale

A typical profile of the Wurno soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 6 inches, dark grayish brown channery silt loam

Subsoil:
6 to 11 inches, brown channery silt loam mottled with dark brown
11 to 16 inches, light yellowish brown extremely channery silt loam

Substratum:
16 to 25 inches, strong brown extremely channery loam

Bedrock:
25 to 32 inches, strong brown, weathered shale
32 inches, interbedded limestone and calcareous shale

Marbie, Timberville, and Wyrick soils are included in areas of this map unit. These soils are along intermittent drainageways, in upland depressions, and on concave foot slopes. Rock outcrops, soils that are shallower to bedrock than the Hagerstown and Wurno soils, and soils that have a gravelly surface layer are included in some areas.

Properties of the Hagerstown soil—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Moderate
Reaction: Strongly acid to slightly acid in the surface layer and in the upper part of the subsoil and strongly acid to neutral in the lower part of the subsoil and in the substratum
Surface runoff: Rapid
Erosion potential: High
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: 40 to 60 inches
Depth to bedrock: 40 to 60 inches
Shrink-swell potential: Moderate
Potential for frost action: Moderate

Properties of the Wurno soil—

Permeability: Moderate
Available water capacity: Very low
Organic matter content: Low
Reaction: Very strongly acid to mildly alkaline in the surface layer and subsoil and neutral or mildly alkaline in the substratum
Surface runoff: Rapid
Erosion potential: High
Tilth: Good

Depth to the seasonal high water table: More than 72 inches
Root zone: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

These soils are used mainly for cultivated crops, hay, or pasture. They are poorly suited to cultivated crops. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, stripcropping, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

These soils are suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

These soils are suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The Wurno soil is droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of the Hagerstown soil for northern red oak is moderately high. The estimated annual production of wood is 360 board feet per acre on north and east exposures and 285 board feet per acre on south and west exposures. The potential productivity of the Wurno soil for northern red oak is moderately high on north and east exposures and moderate on south and west exposures. The estimated annual production of wood is 280 board feet per acre on north and east exposures and 240 board feet per acre on south and west exposures. The slope restricts the use of logging equipment. The erosion potential is a management concern, especially along logging roads and skid trails. Timber can be easily managed on these soils.

Community development is limited by the slope, the depth to bedrock, restricted permeability, low strength, and the shrink-swell potential. These soils are poorly suited to building site development and sanitary facilities.

The land capability classification is IVe.

14E—Hagerstown-Wurno complex, 30 to 45 percent slopes. These soils are steep and well drained. They are on upland side slopes in the Great Valley. The deep Hagerstown and moderately deep Wurno soils occur as areas so closely intermingled that mapping them separately was not practical. This map unit is about 50 percent Hagerstown soil, 30 percent Wurno soil, and 20 percent included soils. Areas range from 5 to 300 acres in size.

A typical profile of the Hagerstown soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, dark yellowish brown silt loam

Subsoil:
7 to 33 inches, strong brown clay mottled with reddish brown and yellow
33 to 42 inches, yellowish red clay mottled with brownish yellow

Substratum:
42 to 55 inches, strong brown clay mottled with brownish yellow and yellowish red

Bedrock:
55 inches, interbedded limestone and calcareous shale

A typical profile of the Wurno soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 6 inches, dark grayish brown channery silt loam

Subsoil:
6 to 11 inches, brown channery silt loam mottled with dark brown
11 to 16 inches, light yellowish brown extremely channery silt loam

Substratum:
16 to 25 inches, strong brown extremely channery loam

Bedrock:
25 to 32 inches, strong brown, weathered shale
32 inches, interbedded limestone and calcareous shale

Marbie, Timberville, and Wyrick soils are included in areas of this map unit. These soils are along intermittent drainageways, in upland depressions, and on concave foot slopes. Rock outcrops, soils that are shallower to bedrock than the Hagerstown and Wurno soils, and soils that have a gravelly surface layer are included in some areas.

Properties of the Hagerstown soil—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Moderate
Reaction: Strongly acid to slightly acid in the surface layer and in the upper part of the subsoil and strongly acid to neutral in the lower part of the subsoil and in the substratum
Surface runoff: Rapid
Erosion potential: High
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: 40 to 60 inches
Depth to bedrock: 40 to 60 inches
Shrink-swell potential: Moderate
Potential for frost action: Moderate

Properties of the Wurno soil—

Permeability: Moderate
Available water capacity: Very low
Organic matter content: Low
Reaction: Very strongly acid to mildly alkaline in the surface layer and subsoil and neutral or mildly alkaline in the substratum
Surface runoff: Rapid
Erosion potential: High
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

These soils are used mainly as pasture. They are generally unsuited to cultivated crops. Crop production is limited by the slope. The erosion potential is a management concern.

These soils are poorly suited to grasses and legumes for pasture. If the soils are used as pasture, grasses and legumes should cover a minimum of 70 percent of the surface. This plant cover is needed to control runoff and erosion. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The Wurno soil is droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of the Hagerstown soil for northern red oak is high. The estimated annual production of wood is 360 board feet per acre on north and east exposures and 285 board feet per acre on south and west exposures. The potential productivity of the Wurno soil for northern red oak is moderately high. The estimated annual production of wood is 280 board feet per acre on north and east exposures and 240 board feet per acre on south and west exposures. The slope restricts the use of logging equipment. The erosion potential is a management concern, especially along logging roads and skid trails.

Community development is limited by the slope, the depth to bedrock, restricted permeability, low strength, and the shrink-swell potential. These soils are poorly suited to building site development and sanitary facilities.

The land capability classification is VIIe.

15B—Ingledove loam, 2 to 7 percent slopes. This soil is gently sloping, very deep, and well drained. It is on stream terraces in the Great Valley. Areas range from 5 to 75 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 10 inches, dark yellowish brown loam

Subsoil:
10 to 32 inches, strong brown sandy clay loam mottled with reddish yellow and pale brown
32 to 45 inches, brown sandy clay loam mottled with pale brown

Substratum:
45 to 72 inches, brown very gravelly loam mottled with very pale brown

Botetourt, Frederick, and Nomberville soils are included in areas of this map unit. Botetourt soils are on stream terraces. Frederick soils are on upland side slopes. Nomberville soils are on flood plains. Soils that have a gravelly surface layer are included in some areas. Included soils make up about 20 percent of this unit.

Soil properties—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Moderate
Reaction: Very strongly acid to neutral in the surface layer and in the upper part of the subsoil and moderately acid to neutral in the lower part of the subsoil and in the substratum
Surface runoff: Medium
Erosion potential: Medium
Tilth: Good
Depth to the seasonal high water table: More than 72 inches

Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

This soil is used mainly for cultivated crops, hay, or pasture. It is prime farmland.

This soil is well suited to cultivated crops, especially corn, small grain, and vegetables. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. When the soil is wet, vehicular traffic can cause compaction, which reduces crop yields. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests.

The potential productivity of this soil for northern red oak is moderately high. The estimated annual production of wood is 290 board feet per acre. Timber can be easily managed on this soil.

Community development is limited by restricted permeability. This soil is suited to building site development and sanitary facilities. The restricted permeability is a limitation on sites for septic tank absorption fields. It can be overcome by enlarging the absorption area.

The land capability classification is IIe.

16C—Jefferson cobbly loam, 7 to 15 percent slopes. This soil is sloping, very deep, and well drained. It is on upland side slopes and foot slopes in the Allegheny Mountains and Blue Ridge province. Areas range from 5 to 100 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 3 inches, dark brown cobbly loam

Subsurface layer:
3 to 10 inches, yellowish brown loam

Subsoil:
10 to 30 inches, yellowish brown loam
30 to 59 inches, strong brown cobbly clay loam

Substratum:
59 to 68 inches, strong brown cobbly clay loam mottled with red

Dekalb, Frederick, and Lily soils are included in areas of this map unit. These soils are on convex side slopes. Soils that are moderately well drained, soils that have a fragipan, and soils that have a stony surface layer are included in some areas. Included soils make up about 25 percent of this unit.

Soil properties—

Permeability: Moderately rapid
Available water capacity: Moderate
Organic matter content: Moderate
Reaction: Very strongly acid or strongly acid
Surface runoff: Rapid
Erosion potential: Medium
Tilth: Poor
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Potential for frost action: Low

This soil is used mainly as woodland. A few areas are used for cultivated crops, hay, or pasture.

This soil is poorly suited to cultivated crops. Rock fragments interfere with cultivation. The erosion potential is a management concern. Runoff and erosion can be controlled by stripcropping, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures,

deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests.

The potential productivity of this soil for northern red oak is high. The estimated annual production of wood is 360 board feet per acre. Timber can be easily managed on this soil.

Community development is limited by the slope and large stones. This soil is suited to building site development and sanitary facilities. The slope and large stones are limitations on sites for local roads and streets, septic tank absorption fields, and buildings. These limitations can be overcome by properly designing the roads and streets, the absorption fields, and the buildings and by removing the stones.

The land capability classification is IVs.

16D—Jefferson cobbly loam, 15 to 35 percent slopes. This soil is moderately steep and steep, very deep, and well drained. It is on upland side slopes and foot slopes in the Allegheny Mountains and the Blue Ridge province. Areas range from 5 to 100 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 3 inches, dark brown cobbly loam

Subsurface layer:
3 to 10 inches, yellowish brown loam

Subsoil:
10 to 30 inches, yellowish brown loam
30 to 59 inches, strong brown cobbly clay loam

Substratum:
59 to 68 inches, strong brown cobbly clay loam mottled with red

Dekalb, Frederick, and Lily soils are included in areas of this map unit. These soils are on convex side slopes. Soils that are moderately well drained, soils that have a fragipan, and soils that have a stony surface layer are included in some areas. Included soils make up about 25 percent of this unit.

Soil properties—

Permeability: Moderately rapid
Available water capacity: Moderate
Organic matter content: Moderate
Reaction: Very strongly acid or strongly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Poor
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Potential for frost action: Low

This soil is used mainly as woodland. A few areas are used for cultivated crops, hay, or pasture.

This soil is generally unsuited to cultivated crops. Rock fragments interfere with cultivation. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, stripcropping, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is generally unsuited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is generally unsuited to grasses and legumes for pasture. If the soil is used as pasture, grasses and legumes should cover a minimum of 70 percent of the surface. This plant cover is needed to control runoff and erosion. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests.

The potential productivity of this soil for northern red oak is moderately high. The estimated annual production of wood is 360 board feet per acre on north and east exposures and 285 board feet per acre on south and west exposures. The slope restricts the use of logging equipment. The erosion potential is a management concern, especially along logging roads and skid trails. Timber can be easily managed on this soil.

Community development is limited by the slope. This soil is poorly suited to building site development and sanitary facilities.

The land capability classification is VIIs.

16E—Jefferson cobbly loam, 35 to 60 percent slopes. This soil is steep and very steep, very deep, and well drained. It is on upland side slopes and foot

slopes in the Allegheny Mountains and Blue Ridge province. Areas range from 5 to 300 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 3 inches, dark brown cobbly loam

Subsurface layer:
3 to 10 inches, yellowish brown loam

Subsoil:
10 to 30 inches, yellowish brown loam
30 to 59 inches, strong brown cobbly clay loam

Substratum:
59 to 68 inches, strong brown cobbly clay loam mottled with red

Dekalb, Frederick, and Lily soils are included in areas of this map unit. These soils are on convex side slopes. Soils that are moderately well drained, soils that have a fragipan, and soils that have a stony surface layer are included in some areas. Included soils make up about 25 percent of this unit.

Soil properties—

Permeability: Moderately rapid
Available water capacity: Moderate
Organic matter content: Moderate
Reaction: Very strongly acid or strongly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Poor
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Potential for frost action: Low

This soil is used mainly as woodland. A few areas are used as pasture.

This soil is generally unsuited to cultivated crops. The slope and the cobbly surface layer are the main limitations. The erosion potential is a management concern.

This soil is generally unsuited to grasses and legumes for pasture. The slope is the main limitation. If the soil is used as pasture, grasses and legumes should cover a minimum of 70 percent of the surface. This plant cover is needed to control runoff and erosion. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests.

The potential productivity of this soil for northern red oak is moderately high on north and east exposures and moderate on south and west exposures. The estimated annual production of wood is 360 board feet per acre on north and east exposures and 285 board feet per acre on south and west exposures. The slope restricts the use of logging equipment. The erosion potential is a management concern, especially along logging roads and skid trails.

Community development is limited by the slope. This soil is poorly suited to building site development and sanitary facilities.

The land capability classification is VIIe.

17C—Lily sandy loam, 7 to 15 percent slopes. This soil is sloping, moderately deep, and well drained. It is on upland summits, shoulder slopes, and side slopes in the Allegheny Mountains, on Lick Mountain, and in the Blue Ridge province. Areas are 5 to 50 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 4 inches, brown sandy loam

Subsoil:
4 to 21 inches, strong brown loam

Substratum:
21 to 28 inches, strong brown loam

Bedrock:
28 inches, sandstone

Dekalb, Jefferson, Matneflat, and Rayne soils are included in areas of this map unit. Dekalb and Rayne soils are in landscape positions similar to those of the Lily soil. Jefferson and Matneflat soils are on colluvial foot slopes and side slopes. Soils that have a stony surface layer are included in some areas. Included soils make up about 25 percent of this unit.

Soil properties—

Permeability: Moderately rapid
Available water capacity: Low
Organic matter content: Moderate
Reaction: Extremely acid to strongly acid
Surface runoff: Rapid
Erosion potential: High

Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Potential for frost action: Low

This soil is used mainly as woodland. A few areas are used for cultivated crops or for pasture.

This soil is suited to cultivated crops. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, stripcropping, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The soil is droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of this soil for northern red oak is moderately high. The estimated annual production of wood is 285 board feet per acre. Timber can be easily managed on this soil.

Community development is limited by the depth to bedrock and the slope. This soil is suited to building site development and sanitary facilities. The depth to bedrock and the slope are limitations on sites for local roads and streets, septic tank absorption fields, and buildings. These limitations can be overcome by properly designing the roads and streets and the buildings and by installing the distribution lines in septic tank absorption fields on the contour and designing the septic tank system so that ground water is less likely to be contaminated.

The land capability classification is IIIe.

17D—Lily sandy loam, 15 to 35 percent slopes. This soil is moderately steep and steep, moderately deep, and well drained. It is on upland side slopes in the Allegheny Mountains, on Lick Mountain, and in the Blue Ridge province. Areas range from 5 to 50 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 4 inches, brown sandy loam

Subsoil:
4 to 21 inches, strong brown loam

Substratum:
21 to 28 inches, strong brown loam

Bedrock:
28 inches, sandstone

Dekalb, Jefferson, Matneflat, and Rayne soils are included in areas of this map unit. Dekalb and Rayne soils are in landscape positions similar to those of the Lily soil. Jefferson and Matneflat soils are on colluvial foot slopes and side slopes. Soils that have a stony surface layer are included in some areas. Included soils make up about 25 percent of this unit.

Soil properties—

Permeability: Moderately rapid
Available water capacity: Low
Organic matter content: Moderate
Reaction: Extremely acid to strongly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Potential for frost action: Low

This soil is used mainly as woodland. A few areas are used for cultivated crops or for pasture.

This soil is generally unsuited to cultivated crops. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, stripcropping, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is poorly suited to grasses and legumes for hay. Hayland management includes crop rotations,

conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is poorly suited to grasses and legumes for pasture. If the soil is used as pasture, grasses and legumes should cover a minimum of 70 percent of the surface. This plant cover is needed to control runoff and erosion. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The soil is droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of this soil for northern red oak is moderately high. The estimated annual production of wood is 285 board feet per acre on north and east exposures and 270 board feet per acre on south and west exposures. The slope restricts the use of logging equipment. The erosion potential is a management concern, especially along logging roads and skid trails. Timber can be easily managed on this soil.

Community development is limited by the slope and the depth to bedrock. This soil is poorly suited to building site development and sanitary facilities.

The land capability classification is VIe.

17E—Lily sandy loam, 35 to 65 percent slopes. This soil is steep and very steep, moderately deep, and well drained. It is on upland side slopes in the Allegheny Mountains, on Lick Mountain, and in the Blue Ridge province. Areas range from 5 to 100 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 4 inches, brown sandy loam

Subsoil:
4 to 21 inches, strong brown loam

Substratum:
21 to 28 inches, strong brown loam

Bedrock:
28 inches, sandstone

Dekalb, Jefferson, Matneflat, and Rayne soils are included in areas of this map unit. Dekalb and Rayne soils are in landscape positions similar to those of the Lily soil. Jefferson and Matneflat soils are on colluvial foot slopes and side slopes. Soils that have a stony surface layer are included in some areas. Included soils make up about 25 percent of this unit.

Soil properties—

Permeability: Moderately rapid
Available water capacity: Low
Organic matter content: Moderate
Reaction: Extremely acid to strongly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Potential for frost action: Low

This soil is used mainly as woodland. A few areas are used as pasture.

This soil is generally unsuited to cultivated crops. The slope is the major limitation. The erosion potential is a management concern.

This soil is generally unsuited to grasses and legumes for pasture. If the soil is used as pasture, grasses and legumes should cover a minimum of 70 percent of the surface. This plant cover is needed to control runoff and erosion. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The soil is droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of this soil for northern red oak is moderately high. The estimated annual production of wood is 285 board feet per acre on north and east exposures and 270 board feet per acre on south and west exposures. The slope restricts the use of logging equipment. The erosion potential is a management concern, especially along logging roads and skid trails.

Community development is limited by the slope and the depth to bedrock. This soil is poorly suited to building site development and sanitary facilities.

The land capability classification is VIIe.

18B—Marbie-Wyrick complex, 2 to 7 percent slopes. These soils are along intermittent upland drainageways, on concave foot slopes, and in depressions in the Great Valley. They are gently sloping

and very deep. The moderately well drained Marbie and well drained Wyrick soils occur as areas so closely intermingled that mapping them separately was not practical. This map unit is about 45 percent Marbie soil, 35 percent Wyrick soil, and 20 percent included soils. Areas range from 5 to 75 acres in size.

A typical profile of the Marbie soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 9 inches, brown silt loam

Subsoil:
9 to 21 inches, yellowish brown silt loam
21 to 46 inches, a fragipan of yellowish brown clay loam mottled with white
46 to 62 inches, yellowish brown clay loam mottled with light gray

A typical profile of the Wyrick soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 13 inches, dark yellowish brown silt loam

Subsoil:
13 to 22 inches, yellowish brown silt loam
22 to 36 inches, yellowish brown silty clay loam mottled with light yellowish brown
36 to 46 inches, yellowish brown silty clay loam mottled with brownish yellow
46 to 53 inches, yellowish brown silty clay
53 to 63 inches, yellowish brown clay

Frederick, Hagerstown, Timberville, and Wurno soils are included in areas of this map unit. Frederick, Hagerstown, and Wurno soils are on convex side slopes. Timberville soils are along drainageways. Rock outcrops and soils that have a cherty surface layer are included in some areas.

Properties of the Marbie soil—

Permeability: Slow
Available water capacity: Moderate
Organic matter content: Low
Reaction: Extremely acid to strongly acid
Surface runoff: Medium
Erosion potential: Medium
Tilth: Good
Depth to the seasonal high water table: 24 to 48 inches
Root zone: 18 to 36 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Potential for frost action: High

Properties of the Wyrick soil—

Permeability: Moderate
Available water capacity: High
Organic matter content: Low
Reaction: Extremely acid to strongly acid
Surface runoff: Medium
Erosion potential: Medium
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Potential for frost action: Moderate

These soils are used mainly for cultivated crops, hay, or pasture. They are prime farmland.

These soils are well suited to cultivated crops, especially corn, vegetables, and small grain. The erosion potential is a management concern. Small grain tends to lodge. Runoff and erosion can be controlled by contour farming, stripcropping, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization. The seasonal high water table may delay spring planting on the Marbie soil.

These soils are well suited to grasses and legumes for hay. Alfalfa stands are short lived because of wetness in the Marbie soil. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

These soils are well suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests.

The potential productivity of these soils for northern red oak is moderately high. The estimated annual production of wood is 280 board feet per acre on the Marbie soil and 360 board feet per acre on the Wyrick soil. Timber can be easily managed on these soils.

Community development is limited on the Marbie soil by wetness, restricted permeability, low strength, the shrink-swell potential, and the potential for frost action. This soil is suited to building site development and sanitary facilities. Low strength and the potential for frost action are limitations on sites for local roads and streets. These limitations can be overcome by strengthening or replacing the base material. The wetness and the restricted permeability are limitations

on sites for sanitary facilities. These limitations can be overcome by enlarging the absorption area. The wetness and the shrink-swell potential are limitations on sites for buildings. They can be overcome by installing drains around footings and by strengthening the foundation.

Community development is limited on the Wyrick soil by restricted permeability, low strength, and the shrink-swell potential. This soil is suited to building site development and sanitary facilities. Low strength and instability are limitations on sites for local roads and streets. These limitations can be overcome by strengthening or replacing the base material. The restricted permeability is a limitation on sites for septic tank absorption fields. It can be overcome by enlarging the absorption area. The shrink-swell potential is a limitation on sites for buildings. It can be overcome by strengthening the foundation.

The land capability classification is IIe.

18C—Marbie-Wyrick complex, 7 to 15 percent slopes. These soils are along intermittent upland drainageways, on concave foot slopes, and in depressions in the Great Valley. They are sloping and very deep. The moderately well drained Marbie and well drained Wyrick soils occur as areas so closely intermingled that mapping them separately was not practical. This map unit is about 45 percent Marbie soil, 35 percent Wyrick soil, and 20 percent included soils. Areas range from 5 to 75 acres in size.

A typical profile of the Marbie soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 9 inches, brown silt loam

Subsoil:
9 to 21 inches, yellowish brown silt loam
21 to 46 inches, a fragipan of yellowish brown loam mottled with white
46 to 62 inches, yellowish brown clay loam mottled with light gray

A typical profile of the Wyrick soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 13 inches, dark yellowish brown silt loam

Subsoil:
13 to 22 inches, yellowish brown silt loam
22 to 36 inches, yellowish brown silty clay loam mottled with light yellowish brown
36 to 46 inches, yellowish brown silty clay loam mottled with brownish yellow
46 to 53 inches, yellowish brown silty clay
53 to 63 inches, yellowish brown clay

Frederick, Hagerstown, Timberville, and Wurno soils are included in areas of this map unit. Frederick, Hagerstown, and Wurno soils are on convex side slopes. Timberville soils are on foot slopes and in low areas along drainageways. Rock outcrops and soils that have a cherty surface layer are included in some areas.

Properties of the Marbie soil—

Permeability: Slow
Available water capacity: Moderate
Organic matter content: Low
Reaction: Extremely acid to strongly acid
Surface runoff: Rapid
Erosion potential: Medium
Tilth: Good
Depth to the seasonal high water table: 24 to 48 inches
Root zone: 18 to 36 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Potential for frost action: High

Properties of the Wyrick soil—

Permeability: Moderate
Available water capacity: High
Organic matter content: Low
Reaction: Extremely acid to strongly acid
Surface runoff: Rapid
Erosion potential: Medium
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Potential for frost action: Moderate

These soils are used mainly for cultivated crops, hay, or pasture. They are suited to cultivated crops, especially corn, small grain, and vegetables. The erosion potential is a management concern. Small grain tends to lodge because of wetness in the Marbie soil. Runoff and erosion can be controlled by contour farming, stripcropping, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization. The seasonal high water table may delay spring planting on the Marbie soil.

These soils are well suited to grasses and legumes for hay. Alfalfa stands are short lived on the Marbie soil because of wetness. Hayland management includes crop rotations, conventional and no-till planting, and

contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

These soils are well suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests.

The potential productivity of these soils for northern red oak is moderately high. The estimated annual production of wood is 280 board feet per acre on the Marbie soil and 360 board feet per acre on the Wyrick soil. Timber can be easily managed on these soils.

Community development is limited on the Marbie soil by the slope, wetness, restricted permeability, low strength, the shrink-swell potential, and the potential for frost action. This soil is suited to building site development and sanitary facilities. Low strength and the potential for frost action are limitations on sites for local roads and streets. These limitations can be overcome by strengthening or replacing the base material. The slope, the wetness, and the restricted permeability are limitations on sites for sanitary facilities. These limitations can be overcome by installing septic tank absorption fields on the contour and by enlarging the absorption area. The slope, the wetness, and the shrink-swell potential are limitations on sites for buildings. They can be overcome by properly designing the buildings, by installing drains around footings, and by strengthening the foundation.

Community development is limited on the Wyrick soil by the slope, restricted permeability, low strength, and the shrink-swell potential. This soil is suited to building site development and sanitary facilities. Low strength and instability are limitations on sites for local roads and streets. These limitations can be overcome by strengthening or replacing the base material. The slope and the restricted permeability are limitations on sites for septic tank absorption fields. These limitations can be overcome by installing the absorption fields on the contour and by enlarging the absorption area. The slope and the shrink-swell potential are limitations on sites for buildings. These limitations can be overcome by properly designing the buildings and by strengthening the foundation.

The land capability classification is IIIe.

18D—Marbie-Wyrick complex, 15 to 25 percent slopes. These soils are along intermittent upland drainageways, on concave foot slopes, and in depressions in the Great Valley. They are moderately steep and very deep. The moderately well drained Marbie and well drained Wyrick soils occur as areas so closely intermingled that mapping them separately was not practical. This map unit is about 45 percent Marbie soil, 35 percent Wyrick soil, and 20 percent included soils. Areas range from 5 to 75 acres in size.

A typical profile of the Marbie soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 9 inches, brown silt loam

Subsoil:
9 to 21 inches, yellowish brown silt loam
21 to 46 inches, a fragipan of yellowish brown loam mottled with white
46 to 62 inches, yellowish brown clay loam mottled with light gray

A typical profile of the Wyrick soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 13 inches, dark yellowish brown silt loam

Subsoil:
13 to 22 inches, yellowish brown silt loam
22 to 36 inches, yellowish brown silty clay loam mottled with light yellowish brown
36 to 46 inches, yellowish brown silty clay loam mottled with brownish yellow
46 to 53 inches, yellowish brown silty clay
53 to 63 inches, yellowish brown clay

Chiswell, Groseclose, Litz, and Timberville soils are included in areas of this map unit. Chiswell, Groseclose, and Litz soils are on convex side slopes. Timberville soils are on upland foot slopes and in low areas along drainageways. Rock outcrops and soils that have a cherty surface layer are included in some areas.

Properties of the Marbie soil—

Permeability: Slow
Available water capacity: Moderate
Organic matter content: Low
Reaction: Extremely acid to strongly acid in unlimed areas
Surface runoff: Rapid
Erosion potential: High
Tilth: Good
Depth to the seasonal high water table: 24 to 48 inches
Root zone: 18 to 36 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Potential for frost action: High

Properties of the Wyrick soil—

Permeability: Moderate

Available water capacity: High
Organic matter content: Low
Reaction: Extremely acid to strongly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Potential for frost action: Moderate

These soils are used mainly for hay, pasture, or woodland. They are poorly suited to cultivated crops. The erosion potential is a management concern. Small grain tends to lodge because of wetness in the Marbie soil. Runoff and erosion can be controlled by contour farming, stripcropping, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization. The seasonal high water table may delay spring planting on the Marbie soil.

These soils are suited to grasses and legumes for hay. Alfalfa stands are short lived on the Marbie soil because of wetness. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

These soils are suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests.

The potential productivity of the Marbie soil for northern red oak is moderately high on north and east exposures and moderate on south and west exposures. The estimated annual production of wood is 282 board feet per acre on north and east exposures and 237 board feet per acre on south and west exposures. The potential productivity of the Wyrick soil for northern red oak is moderately high. The estimated annual production of wood is 330 board feet per acre on north and east exposures and 310 board feet per acre on south and west exposures. Timber can be easily managed on these soils.

Community development is limited by the slope, wetness, restricted permeability, low strength, the shrink-swell potential, and the potential for frost action. These soils are poorly suited to building site development and sanitary facilities.

The land capability classification is IVe.

19C—Matneflat gravelly sandy loam, 7 to 15 percent slopes, stony. This soil is sloping, very deep, and well drained. It is on low summits, shoulder slopes, and foot slopes on Lick Mountain. Areas range from 5 to 100 acres in size. Stones cover about 0.1 to 3.0 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 4 inches, brown gravelly sandy loam

Subsoil:
4 to 21 inches, reddish yellow sandy loam
21 to 38 inches, strong brown sandy loam mottled with reddish yellow
38 to 62 inches, mottled yellowish red, red, and yellowish brown gravelly coarse sandy loam

Dekalb, Frederick, and Lily soils are included in areas of this map unit. These soils are in landscape positions similar to those of the Matneflat soil. Rock outcrops, boulders, and soils that are moderately well drained, have a fragipan, or both are included in some areas. In some included areas along the base of Lick Mountain, the surface layer is not stony. Included areas make up about 25 percent of this unit.

Soil properties—

Permeability: Moderately rapid
Available water capacity: Low
Organic matter content: Low
Reaction: Extremely acid to strongly acid
Surface runoff: Rapid
Erosion potential: Medium
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Potential for frost action: Low

This soil is used mainly as woodland. A few areas are used for cultivated crops, hay, or pasture.

This soil is poorly suited to cultivated crops unless the stones are removed. The stones interfere with cultivation. The soil is droughty. The erosion potential is

a management concern. Runoff and erosion can be controlled by contour farming, stripcropping, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The soil is droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of this soil for northern red oak is moderately high. The estimated annual production of wood is 260 board feet per acre. Timber can be easily managed on this soil.

Community development is limited by the slope. This soil is suited to building site development and sanitary facilities. The slope is a limitation on sites for local roads and streets, sanitary facilities, and buildings. It can be overcome by proper design.

The land capability classification is IVs.

19D—Matneflat gravelly sandy loam, 15 to 35 percent slopes, stony. This soil is moderately steep and steep, very deep, and well drained. It is on low foot slopes and side slopes on Lick Mountain. Areas range from 5 to 100 acres in size. Stones cover about 0.1 to 3.0 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 4 inches, brown gravelly sandy loam

Subsoil:
4 to 21 inches, reddish yellow sandy loam
21 to 38 inches, strong brown sandy loam mottled with reddish yellow
38 to 62 inches, mottled yellowish red, red, and yellowish brown gravelly coarse sandy loam

Dekalb, Frederick, and Lily soils are included in areas of this map unit. These soils are in landscape positions similar to those of the Matneflat soil. Rock outcrops, boulders, and soils that are moderately well drained, have a fragipan, or both are included in some areas. In some included areas along the base of Lick Mountain, the surface layer is not stony. Included areas make up about 25 percent of this unit.

Soil properties—

Permeability: Moderately rapid
Available water capacity: Low
Organic matter content: Low
Reaction: Extremely acid to strongly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Potential for frost action: Low

This soil is used mainly as woodland. A few areas are used for cultivated crops, hay, or pasture.

This soil is generally unsuited to cultivated crops. The stones in the surface layer and the slope are the main limitations. The soil is droughty. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, stripcropping, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is poorly suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is poorly suited to grasses for pasture. If the soil is used as pasture, grasses and legumes should cover a minimum of 70 percent of the surface. This plant cover is needed to control runoff and erosion. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The soil is droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of this soil for northern red oak is moderately high on north and east exposures and moderate on south and west exposures. The estimated annual production of wood is 315 board feet per acre on north and east exposures and 261 board feet per acre on south and west exposures. The slope restricts the use of logging equipment. The erosion potential is a management concern, especially along logging roads and skid trails. Timber can be easily managed on this soil.

Community development is limited by the slope. This soil is poorly suited to building site development and sanitary facilities.

The land capability classification is VIs.

19E—Matneflat gravelly sandy loam, 35 to 65 percent slopes, stony. This soil is steep and very steep, very deep, and well drained. It is on low side slopes on Lick Mountain. Areas range from 5 to 300 acres in size. Stones cover about 0.1 to 3.0 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 4 inches, brown gravelly sandy loam

Subsoil:
4 to 21 inches, reddish yellow sandy loam
21 to 38 inches, strong brown sandy loam mottled with reddish yellow
38 to 62 inches, mottled yellowish red, red, and yellowish brown gravelly coarse sandy loam

Dekalb, Frederick, and Lily soils are included in areas of this map unit. These soils are in landscape positions similar to those of the Matneflat soil. Rock outcrops, boulders, and soils that are moderately well drained, have a fragipan, or both are included in some areas. In some included areas along the base of Lick Mountain, the surface layer is not stony. Included areas make up about 25 percent of this unit.

Soil properties—

Permeability: Moderately rapid
Available water capacity: Low
Organic matter content: Low
Reaction: Extremely acid to strongly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Potential for frost action: Low

This soil is used mainly as woodland. A few areas are used as pasture.

This soil is generally unsuited to cultivated crops. The slope and the stones in the surface layer are the main limitations. The erosion potential is a management concern.

This soil is poorly suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is poorly suited to grasses and legumes for pasture. The slope and large stones are limitations. If the soil is used as pasture, grasses and legumes should cover a minimum of 70 percent of the surface. This plant cover is needed to control runoff and erosion. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The soil is droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of this soil for northern red oak is moderately high on north and east exposures and moderate on south and west exposures. The estimated annual production of wood is 260 board feet per acre on north and east exposures and 220 board feet per acre on south and west exposures. The slope restricts the use of logging equipment. The erosion potential is a management concern, especially along logging roads and skid trails.

Community development is limited by the slope. This soil is poorly suited to building site development and sanitary facilities.

The land capability classification is VIIe.

20A—Nomberville silt loam, 0 to 3 percent slopes, occasionally flooded. This soil is nearly level, very deep, and well drained. It is on flood plains in the Great Valley and is flooded for brief periods. Areas range from 5 to 50 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 12 inches, dark brown silt loam

Subsoil:
12 to 21 inches, dark brown silt loam
21 to 41 inches, brown silt loam

Substratum:
41 to 67 inches, brown loam

Evansham, Gullion, and Ingledove soils are included in areas of this map unit. Evansham and Gullion soils are on flood plains. Ingledove soils are on stream terraces. Soils that have a gravelly surface layer are included in some areas. Included soils make up about 20 percent of this unit.

Soil properties—

Permeability: Moderate
Available water capacity: High
Organic matter content: Moderate
Reaction: Moderately acid to moderately alkaline
Surface runoff: Slow
Erosion potential: Low
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Potential for frost action: High
Flooding: Occasional, brief

This soil is used mainly for cultivated crops or for pasture. It is prime farmland.

This soil is well suited to cultivated crops, especially corn, small grain, and vegetables. Flooding damages the crops and delays planting and harvesting. When the soil is wet, vehicular traffic can cause compaction, which reduces crop yields. Yields can be increased by applying fertilizer according to the results of soil tests. A starter fertilizer high in phosphorus and low in potassium and nitrogen should be applied in areas used for corn. Plant tissue tests should be used to monitor micronutrient requirements. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for hay. Hayland management includes crop rotations and conventional and no-till planting. Yields can be increased by applying fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is very well suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying fertilizer according to the results of soil tests.

The potential productivity of this soil for Virginia pine is high. The estimated annual production of wood is 660 board feet per acre. Timber can be easily managed on this soil.

Community development is limited by flooding, low strength, and the potential for frost action. This soil is poorly suited to building site development and sanitary facilities.

The land capability classification is I.

21A—Pagebrook silt loam, 0 to 3 percent slopes, rarely flooded. This soil is nearly level, very deep, and moderately well drained. It is on flood plains in the Great Valley and is flooded for brief periods. Areas range from about 5 to more than 75 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, brown silt loam

Subsoil:
8 to 26 inches, dark brown clay
26 to 34 inches, yellowish brown clay mottled with grayish brown
34 to 63 inches, mottled strong brown and grayish brown clay

Evansham, Gullion, and Nomberville soils are included in areas of this map unit. These soils are on flood plains. They make up about 20 percent of this unit.

Soil properties—

Permeability: Moderate to slow
Available water capacity: Moderate
Organic matter content: Low
Reaction: Strongly acid to mildly alkaline in the surface layer and in the upper part of the subsoil and slightly acid to moderately alkaline in the lower part of the subsoil and in the substratum
Surface runoff: Slow
Erosion potential: Low
Tilth: Poor
Depth to the seasonal high water table: 24 to 48 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Potential for frost action: Moderate
Flooding: Rare, brief

This soil is used mainly for cultivated crops or for pasture. It is prime farmland.

This soil is well suited to cultivated crops. Flooding

and wetness damage crops and delay planting and harvesting. Small grain tends to lodge. Yields can be increased by applying fertilizer according to the results of soil tests. A starter fertilizer high in phosphorus and low in potassium and nitrogen should be applied in areas used for corn. Plant tissue tests should be used to monitor micronutrient requirements. Plant nutrient management should include animal manure analysis and utilization. Tilling when the soil is wet results in the formation of clods and an undesirable seedbed and thus hinders seed germination.

This soil is well suited to grasses and legumes for hay. Alfalfa and red clover stands are short lived because of wetness. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and white clover for pasture. Red clover stands are short lived because of wetness. Pasture management includes rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying fertilizer according to the results of soil tests.

The potential productivity of this soil for northern red oak is moderately high. The estimated annual production of wood is 280 board feet per acre. Timber production is high. Wetness and the clayey texture are management concerns.

Community development is limited by flooding, wetness, the shrink-swell potential, restricted permeability, and low strength. This soil is poorly suited to building site development and sanitary facilities.

The land capability classification is IIw.

22—Pits, quarries. This map unit consists of open excavations from which iron ore, limestone, shale, and sand have been removed (fig. 10). The iron ore pits are along Cripple Creek and the New River. They are as much as 5 acres in size. The limestone quarries are in the Great Valley. They range from about 3 to 75 acres in size. The sand pits are primarily on Lick Mountain. They are as much as 75 acres in size. The shale pits are primarily in the Blue Ridge and Allegheny Mountains. They are as much as 5 acres in size.

The limestone, shale, and sand are used as construction material. The sand also is used for manufacturing glass.

This map unit is not suited to farming and is poorly suited to community development. Onsite investigation is necessary to determine the suitability of a given area for a specific use.

No land capability classification is assigned.

23C—Rayne-Berks complex, 7 to 15 percent slopes. These soils are sloping and well drained. They are on upland summits, shoulder slopes, and side slopes in the Allegheny Mountains. The deep Rayne and moderately deep Berks soils occur as areas so closely intermingled that mapping them separately was not practical. This map unit is about 45 percent Rayne soil, 35 percent Berks soil, and 20 percent included soils. Areas range from 5 to 50 acres in size.

A typical profile of the Rayne soil has the following sequence of layers, texture, and colors—

Surface layer:
0 to 6 inches, yellowish brown silt loam

Subsoil:
6 to 27 inches, yellowish brown silty clay loam
27 to 47 inches, yellowish brown channery silty clay loam mottled with yellow, red, and gray

Substratum:
47 to 58 inches, mottled yellow, brown, and gray very channery silt loam

Bedrock:
58 inches, shale

A typical profile of the Berks soil has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 4 inches, dark brown channery silt loam

Subsoil:
4 to 11 inches, light yellowish brown channery silt loam
11 to 19 inches, yellowish brown very channery silt loam

Substratum:
19 to 27 inches, yellowish brown extremely channery silt loam

Bedrock:
27 inches, shale

Frederick, Lily, and Weikert soils are included in areas of this map unit. These soils are in landscape positions similar to those of the Rayne and Berks soils. Soils that have a stony surface layer are included in some areas.

Properties of the Rayne soil—

Permeability: Moderate
Available water capacity: Moderate

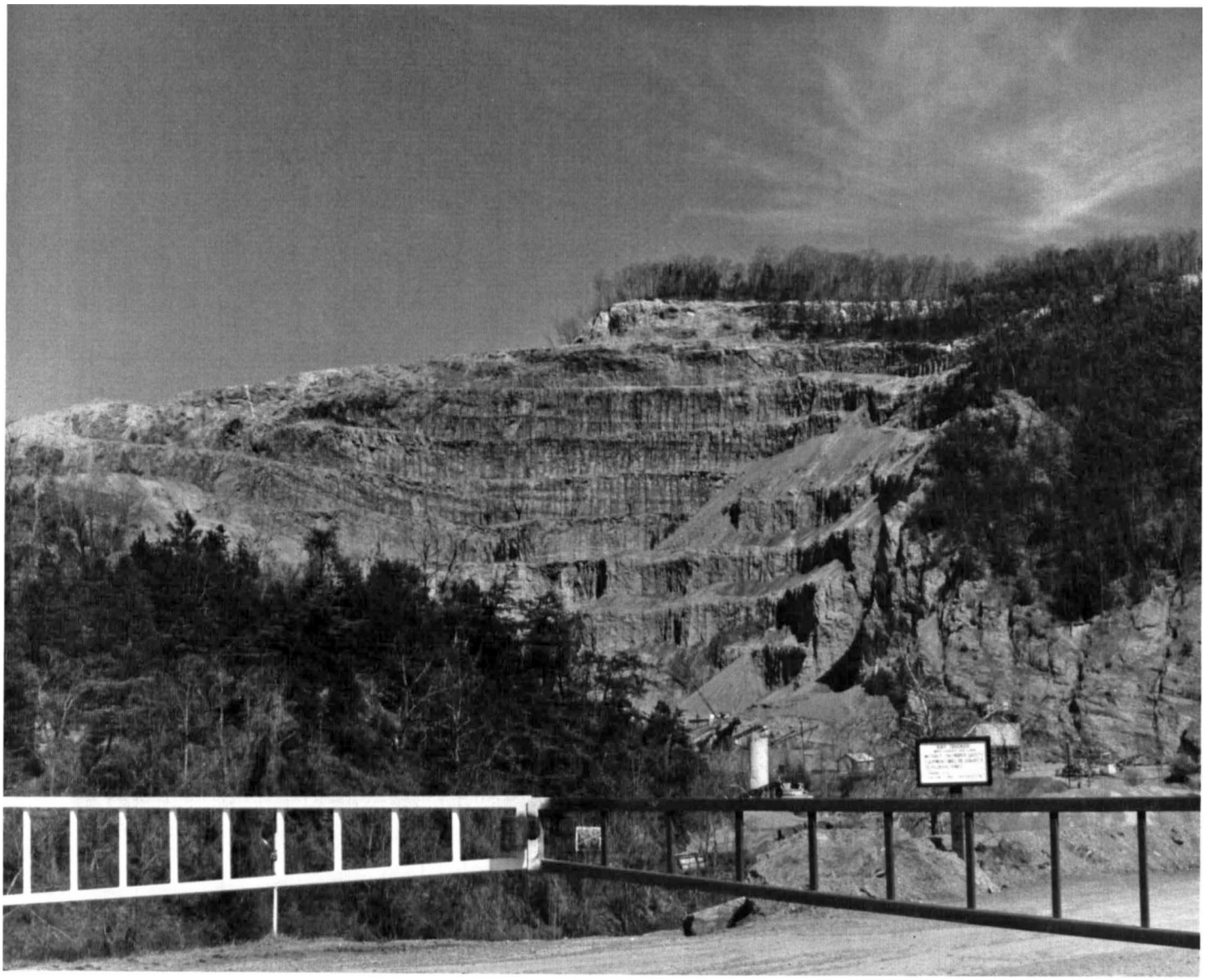

Figure 10.—An area of Pits, quarries, from which phyllite and shale are quarried for use as construction material.

Organic matter content: Low
Reaction: Very strongly acid or strongly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: 40 to 60 inches
Depth to bedrock: 40 to 60 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

Properties of the Berks soil—

Permeability: Moderate or moderately rapid
Available water capacity: Very low
Organic matter content: Low
Reaction: Extremely acid to slightly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Fair
Depth to the seasonal high water table: More than 72 inches
Root zone: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Potential for frost action: Low

These soils are used mainly as woodland. A few areas are used for cultivated crops or for pasture.

These soils are suited to cultivated crops. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, stripcropping, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

These soils are well suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

These soils are well suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The soils are droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of these soils for northern red oak is moderately high. The estimated annual production of wood is 290 board feet per acre on the Rayne soil and 280 board feet per acre on the Berks soil. Timber can be easily managed on these soils.

Community development is limited on the Rayne soil by the slope, the depth to bedrock, the potential for frost action, and restricted permeability. This soil is suited to building site development and sanitary facilities. The slope and low strength are limitations on sites for local roads and streets. These limitations can be overcome by properly designing the roads and streets and by strengthening or replacing the base material. The slope, the depth to bedrock, and the restricted permeability are limitations on sites for septic tank absorption fields. They can be overcome by installing the absorption fields on the contour and by enlarging the absorption area or specially designing the septic tank system. The slope is a limitation on sites for buildings. It can be overcome by properly designing the buildings.

The land capability classification is IIIe.

23D—Rayne-Berks complex, 15 to 35 percent slopes. These soils are moderately steep and steep and are well drained. They are on upland side slopes in the Allegheny Mountains. The deep Rayne and moderately deep Berks soils occur as areas so closely intermingled that mapping them separately was not practical. This map unit is about 45 percent Rayne soil, 35 percent Berks soil, and 20 percent included soils. Areas range from 5 to 100 acres in size.

A typical profile of the Rayne soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 6 inches, yellowish brown silt loam

Subsoil:
6 to 27 inches, yellowish brown silty clay loam
27 to 47 inches, yellowish brown channery silty clay loam mottled with yellow, red, and gray

Substratum:
47 to 58 inches, mottled yellow, brown, and gray very channery silt loam

Bedrock:
58 inches, shale

A typical profile of the Berks soil has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 4 inches, dark brown channery silt loam

Subsoil:
4 to 11 inches, light yellowish brown channery silt loam
11 to 19 inches, yellowish brown very channery silt loam

Substratum:
19 to 27 inches, yellowish brown extremely channery silt loam

Bedrock:
27 inches, shale

Frederick, Lily, and Weikert soils are included in areas of this map unit. These soils are in landscape positions similar to those of the Rayne and Berks soils. Soils that have a stony surface layer are included in some areas.

Properties of the Rayne soil—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Low
Reaction: Very strongly acid or strongly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Good
Depth to the seasonal high water table: More than 72 inches

Root zone: 40 to 60 inches
Depth to bedrock: 40 to 60 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

Properties of the Berks soil—

Permeability: Moderate or moderately rapid
Available water capacity: Very low
Organic matter content: Low
Reaction: Extremely acid to slightly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Fair
Depth to the seasonal high water table: More than 72 inches
Root zone: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Potential for frost action: Low

These soils are used mainly as woodland. A few areas are used for cultivated crops or for pasture.

These soils are generally unsuited to cultivated crops. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, stripcropping, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

These soils are poorly suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

These soils are poorly suited to grasses and legumes for pasture. If the soils are used as pasture, grasses and legumes should cover a minimum of 70 percent of the surface. This plant cover is needed to control runoff and erosion. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The soils are droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of the Rayne soil for northern red oak is moderately high. The estimated annual production of wood is 290 board feet per acre on north and east exposures and 280 board feet per acre on south and west exposures. The potential productivity of the Berks soil for northern red oak is moderately high on north and east exposures and moderate on south and west exposures. The estimated annual production of wood is 280 board feet per acre on north and east exposures and 240 board feet per acre on south and west exposures. Timber can be easily managed on these soils. The slope restricts the use of logging equipment. The erosion potential is a management concern, especially along logging roads and skid trails.

Community development is limited by the slope, the depth to bedrock, and restricted permeability. These soils are poorly suited to building site development and sanitary facilities.

The land capability classification is VIe.

23E—Rayne-Berks complex, 35 to 60 percent slopes. These soils are steep and very steep and are well drained. They are on upland side slopes in the Allegheny Mountains. The deep Rayne and moderately deep Berks soils occur as areas so closely intermingled that mapping them separately was not practical. This map unit is about 45 percent Rayne soil, 35 percent Berks soil, and 20 percent included soils. Areas range from 25 to 300 acres in size.

A typical profile of the Rayne soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 6 inches, yellowish brown silt loam

Subsoil:
6 to 27 inches, yellowish brown silty clay loam
27 to 47 inches, yellowish brown channery silty clay loam mottled with yellow, red, and gray

Substratum:
47 to 58 inches, mottled yellow, brown, and gray very channery silt loam

Bedrock:
58 inches, shale

A typical profile of the Berks soil has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 4 inches, dark brown channery silt loam

Subsoil:
4 to 11 inches, light yellowish brown channery silt loam
11 to 19 inches, yellowish brown very channery silt loam

Substratum:
19 to 27 inches, yellowish brown extremely channery silt loam

Bedrock:
27 inches, shale

Frederick, Lily, and Weikert soils are included in areas of this map unit. These soils are in landscape positions similar to those of the Rayne and Berks soils. Soils that have a stony surface layer are included in some areas.

Properties of the Rayne soil—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Low
Reaction: Very strongly acid or strongly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: 40 to 60 inches
Depth to bedrock: 40 to 60 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

Properties of the Berks soil—

Permeability: Moderate or moderately rapid
Available water capacity: Very low
Organic matter content: Low
Reaction: Extremely acid to slightly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Fair
Depth to the seasonal high water table: More than 72 inches
Root zone: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Potential for frost action: Low

These soils are used mainly as woodland. A few areas are used as pasture.

These soils are generally unsuited to cultivated crops. Crop production is limited by the slope and droughtiness. The erosion potential is a management concern.

These soils are generally unsuited to grasses and legumes for pasture. If the soils are used as pasture, grasses and legumes should cover a minimum of 70 percent of the surface. This plant cover is needed to control runoff and erosion. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The soils are droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of the Rayne soil for northern red oak is moderately high. The estimated annual production of wood is 290 board feet per acre on north and east exposures and 280 board feet per acre on south and west exposures. The potential productivity of the Berks soil for northern red oak is moderately high on north and east exposures and moderate on south and west exposures. The estimated annual production of wood is 280 board feet per acre on north and east exposures and 240 board feet per acre on south and west exposures. The slope restricts the use of logging equipment. The erosion potential is a management concern, especially along logging roads and skid trails.

Community development is limited by the slope, the depth to bedrock, and restricted permeability. These soils are poorly suited to building site development and sanitary facilities.

The land capability classification is VIIe.

24F—Rock outcrop-Wurno complex, 35 to 75 percent slopes. This map unit is on uplands along the major streams and rivers in the Great Valley. The Rock outcrop is on steep and very steep slopes and vertical cliffs. The Wurno soil is very steep, moderately deep, and well drained. This soil and the Rock outcrop occur as areas so closely intermingled that mapping them separately was not practical. This unit is about 40 percent Rock outcrop, 35 percent Wurno soil, and 25 percent included soils. Areas range from 5 to 200 acres in size.

A typical profile of the Wurno soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 6 inches, dark grayish brown channery silt loam

Subsoil:
6 to 11 inches, brown channery silt loam mottled with dark brown
11 to 16 inches, light yellowish brown extremely channery silt loam

Substratum:
16 to 25 inches, strong brown extremely channery loam

Bedrock:
25 to 32 inches, strong brown, weathered shale

32 inches, interbedded calcareous shale and limestone

Chiswell, Frederick, Nomberville, and Speedwell soils are included in areas of this map unit. Chiswell and Frederick soils are in landscape positions similar to those of the Wurno soil. Nomberville and Speedwell soils are on narrow flood plains.

Properties of the Wurno soil—

Permeability: Moderate
Available water capacity: Very low
Organic matter content: Moderate
Reaction: Very strongly acid to mildly alkaline in the surface layer and subsoil and neutral or mildly alkaline in the substratum
Surface runoff: Rapid
Erosion potential: High
Tilth: Poor
Depth to the seasonal high water table: More than 72 inches
Root zone: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

This map unit is used as woodland. It is unsuited to farming, woodland, and community development because of the slope and the Rock outcrop.

The land capability classification is VIII.

25B—Shottower loam, 2 to 7 percent slopes. This soil is gently sloping, very deep, and well drained. It is on high stream terraces in the Great Valley. Areas range from 5 to more than 100 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 10 inches, brown loam

Subsoil:
10 to 19 inches, yellowish red clay loam
19 to 40 inches, red clay mottled with yellowish red
40 to 72 inches, red clay mottled with yellowish brown

Austinville, Ingledove, and Speedwell soils are included in areas of this map unit. Austinville soils are on upland side slopes. Ingledove soils are on stream terraces. Speedwell soils are on flood plains. Soils that have a cobbly surface layer are included in some areas. Included soils make up about 20 percent of this unit.

Soil properties—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Low
Reaction: Extremely acid to moderately acid
Surface runoff: Medium
Erosion potential: Medium
Tilth: Fair
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Potential for frost action: Moderate

This soil is used mainly for cultivated crops, hay, or pasture. In some areas it is used as woodland. It is prime farmland.

This soil is well suited to cultivated crops, especially corn, vegetables, and small grain. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, no-till planting, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. A starter fertilizer high in phosphorus and low in potassium and nitrogen should be applied in areas used for corn. Plant tissue tests should be used to monitor micronutrient requirements. Plant nutrient management should include animal manure analysis and utilization. Tilling when the soil is wet destroys soil structure, results in the formation of clods and an undesirable seedbed, and thus hinders seed germination.

This soil is well suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests.

The potential productivity of this soil for northern red oak is moderately high. The estimated annual production of wood is 290 board feet per acre. Timber can be easily managed on this soil.

Community development is limited by low strength, the shrink-swell potential, and restricted permeability. This soil is suited to building site development and sanitary facilities. Low strength and instability are limitations on sites for local roads and streets. These limitations can be overcome by strengthening or

replacing the base material. The restricted permeability is a limitation on sites for septic tank absorption fields. It can be overcome by enlarging the absorption area. The shrink-swell potential is a limitation on sites for buildings. It can be overcome by strengthening the foundation.

The land capability classification is IIe.

25C—Shottower loam, 7 to 15 percent slopes. This soil is sloping, very deep, and well drained. It is on high stream terraces in the Great Valley. Areas range from 5 to more than 100 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 10 inches, brown loam

Subsoil:
10 to 19 inches, yellowish red clay loam
19 to 40 inches, red clay mottled with yellowish red
40 to 72 inches, red clay mottled with yellowish brown

Austinville, Ingledove, and Speedwell soils are included in areas of this map unit. Austinville soils are on upland side slopes. Ingledove soils are on stream terraces. Speedwell soils are on flood plains. Soils that have a cobbly surface layer are included in some areas. Included soils make up about 20 percent of this unit.

Soil properties—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Low
Reaction: Extremely acid to moderately acid
Surface runoff: Rapid
Erosion potential: Medium
Tilth: Fair
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Potential for frost action: Moderate

This soil is used mainly for cultivated crops, hay, or pasture. Some areas are used as woodland.

This soil is suited to cultivated crops, especially corn, vegetables, and small grain. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, no-till planting, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. A starter fertilizer high in phosphorus and low in potassium and nitrogen should be applied in areas used for corn. Plant tissue tests should be used to monitor micronutrient requirements. Plant nutrient management should include animal manure analysis and utilization. Tilling when the soil is wet destroys soil structure, results in the formation of clods and an undesirable seedbed, and thus hinders seed germination.

This soil is well suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests.

The potential productivity of this soil for northern red oak is moderately high. The estimated annual production of wood is 290 board feet per acre. Timber can be easily managed on this soil.

Community development is limited by the slope, low strength, the shrink-swell potential, and restricted permeability. This soil is suited to building site development and sanitary facilities. Low strength and instability are limitations on sites for local roads and streets. These limitations can be overcome by strengthening or replacing the base material. The slope and the restricted permeability are limitations on sites for septic tank absorption fields. They can be overcome by installing the absorption fields on the contour and by enlarging the absorption area. The slope and the shrink-swell potential are limitations on sites for buildings. These limitations can be overcome by properly designing the buildings and by strengthening the foundation.

The land capability classification is IIIe.

25D—Shottower loam, 15 to 30 percent slopes. This soil is moderately steep and steep, very deep, and well drained. It is on side slopes on high stream terraces in the Great Valley. Areas range from 5 to more than 100 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 10 inches, brown loam

Subsoil:
10 to 19 inches, yellowish red clay loam

19 to 40 inches, red clay mottled with yellowish red
40 to 72 inches, red clay mottled with yellowish brown

Austinville, Ingledove, and Speedwell soils are included in areas of this map unit. Austinville soils are on upland side slopes. Ingledove soils are on stream terraces. Speedwell soils are on flood plains. Soils that have a cobbly surface layer are included in some areas. Included soils make up about 20 percent of this unit.

Soil properties—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Low
Reaction: Extremely acid to moderately acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Fair
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Potential for frost action: Moderate

This soil is used mainly for cultivated crops, hay, or pasture. Some areas are used as woodland.

This soil is poorly suited to cultivated crops. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, no-till planting, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. A starter fertilizer high in phosphorus and low in potassium and nitrogen should be applied in areas used for corn. Plant tissue tests should be used to monitor micronutrient requirements. Plant nutrient management should include animal manure analysis and utilization. Tilling when the soil is wet destroys soil structure, results in the formation of clods and an undesirable seedbed, and thus hinders seed germination.

This soil is suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests.

The potential productivity of this soil for northern red oak is moderately high. The estimated annual production of wood is 290 board feet per acre on north and east exposures and 280 board feet per acre on south and west exposures. The slope restricts the use of logging equipment. The erosion potential is a management concern, especially along logging roads and skid trails. Timber can be easily managed on this soil.

Community development is limited by the slope, low strength, the shrink-swell potential, and restricted permeability. This soil is poorly suited to building site development and sanitary facilities.

The land capability classification is IVe.

26A—Sindion loam, 0 to 3 percent slopes, occasionally flooded. This soil is nearly level, very deep, and moderately well drained. It is on flood plains along the New River and Cripple Creek in the Great Valley and is flooded for brief periods. Areas range from 5 to 60 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 10 inches, dark brown loam

Subsoil:
10 to 21 inches, very dark grayish brown loam
21 to 31 inches, mottled grayish brown, yellowish brown, and black loam
31 to 41 inches, strong brown clay loam mottled with gray

Substratum:
41 to 65 inches, gray very cobbly sandy loam mottled with brown and yellowish brown

Clubcaf, Speedwell, and Wheeling soils are included in areas of this map unit. Clubcaf and Speedwell soils are on flood plains. Wheeling soils are on stream terraces. Soils that have a gravelly or cobbly surface layer are included in some areas. Included soils make up about 15 percent of this unit.

Soil properties—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Moderate
Reaction: Slightly acid to moderately alkaline
Surface runoff: Slow
Erosion potential: Low
Tilth: Good
Depth to the seasonal high water table: 18 to 36 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches

Shrink-swell potential: Low
Potential for frost action: High
Flooding: Occasional, brief

This soil is used mainly for cultivated crops or for pasture. It is prime farmland.

This soil is well suited to cultivated crops, especially corn, small grain, and vegetables. Flooding damages the crops and delays planting and harvesting. Small grain tends to lodge. When the soil is wet, vehicular traffic can cause compaction, which reduces crop yields. Yields can be increased by applying fertilizer according to the results of soil tests. A starter fertilizer high in phosphorus and low in potassium and nitrogen should be applied in areas used for corn. Plant tissue tests should be used to monitor micronutrient requirements. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for hay. Alfalfa and red clover stands are short lived because of wetness. Hayland management includes crop rotations and conventional and no-till planting. Yields can be increased by applying fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and white clover for pasture. Red clover stands are short lived because of wetness. Pasture management includes rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying fertilizer according to the results of soil tests.

The potential productivity of this soil for northern red oak is moderately high. The estimated annual production of wood is 290 board feet per acre. Wetness and flooding are management concerns.

Community development is limited by flooding, wetness, and the potential for frost action. This soil is poorly suited to building site development and sanitary facilities.

The land capability classification is IIw.

27A—Speedwell sandy loam, 0 to 3 percent slopes, occasionally flooded. This soil is nearly level, very deep, and well drained. It is on flood plains along the New River and Cripple Creek in the Great Valley and is flooded for brief periods. Areas range from 10 to 200 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 18 inches, dark brown sandy loam

Subsoil:
18 to 42 inches, dark yellowish brown sandy clay loam

Substratum:
42 to 72 inches, dark yellowish brown gravelly coarse sandy loam

Sindion, Shottower, and Wheeling soils are included in areas of this map unit. Sindion soils are on flood plains. Wheeling soils are on stream terraces. Shottower soils are on high terraces. Soils that have a gravelly surface layer are included in some areas. Included soils make up about 15 percent of this unit.

Soil properties—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Moderate
Reaction: Slightly acid to moderately alkaline
Surface runoff: Slow
Erosion potential: Low
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Potential for frost action: Moderate
Flooding: Occasional, brief

This soil is used mainly for cultivated crops or for pasture. It is prime farmland.

This soil is well suited to cultivated crops, especially corn, small grain, and vegetables. Flooding can damage crops and delay planting and harvesting. Small grain tends to lodge. When the soil is wet, vehicular traffic can cause compaction, which reduces crop yields. Yields can be increased by applying fertilizer according to the results of soil tests. A starter fertilizer high in phosphorus and low in potassium and nitrogen should be applied in areas used for corn. Plant tissue tests should be used to monitor micronutrient requirements. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for hay. Hayland management includes crop rotations and conventional and no-till planting. Yields can be increased by applying fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for pasture. Pasture management includes rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying fertilizer according to the results of soil tests.

The potential productivity of this soil for northern red oak is moderately high. The estimated annual production of wood is 290 board feet per acre. Wetness

and flooding are management concerns.

Community development is limited by flooding. This soil is poorly suited to building site development and sanitary facilities.

The land capability classification is I.

28C—Sylvatus-Sylco complex, 7 to 15 percent slopes. These soils are sloping and well drained. They are on upland summits, shoulder slopes, and side slopes in the Blue Ridge province and on Lick Mountain. The shallow Sylvatus and moderately deep Sylco soils occur as areas so closely intermingled that mapping them separately was not practical (fig. 11). This map unit is about 45 percent Sylvatus soil, 35 percent Sylco soil, and 20 percent included soils. Areas range from 5 to 50 acres in size.

A typical profile of the Sylvatus soil has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 3 inches, brown channery silt loam

Subsoil:
3 to 7 inches, strong brown channery silt loam
7 to 15 inches, strong brown extremely channery silt loam

Substratum:
15 to 18 inches, mottled reddish yellow and very dark gray extremely channery silt loam

Bedrock:
18 inches, phyllite

A typical profile of the Sylco soil has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 3 inches, dark grayish brown channery silt loam

Subsurface layer:
3 to 7 inches, brown channery silt loam

Subsoil:
7 to 25 inches, yellowish brown very channery silt loam

Substratum:
25 to 35 inches, yellowish brown extremely channery silt loam

Bedrock:
35 inches, phyllite

Dekalb, Jefferson, and Matneflat soils are included in areas of this map unit. Dekalb soils are in landscape positions similar to those of the Sylvatus and Sylco soils. Jefferson and Matneflat soils are on colluvial foot slopes and benches.

Properties of the Sylvatus soil—

Permeability: Moderate
Available water capacity: Very low
Organic matter content: Low
Reaction: Extremely acid or very strongly acid
Surface runoff: Medium
Erosion potential: High
Tilth: Fair
Depth to the seasonal high water table: More than 72 inches
Root zone: 10 to 20 inches
Depth to bedrock: 10 to 20 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

Properties of the Sylco soil—

Permeability: Moderate
Available water capacity: Low
Organic matter content: Low
Reaction: Very strongly acid or strongly acid
Surface runoff: Medium
Erosion potential: High
Tilth: Fair
Depth to the seasonal high water table: More than 72 inches
Root zone: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

These soils are used mainly as woodland. A few areas are used for cultivated crops or for pasture.

These soils are poorly suited to cultivated crops. The low or very low available water capacity, the acidity, and low natural fertility are limitations. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, stripcropping, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

These soils are suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer

Figure 11.—A profile of Sylvatus-Sylco complex, 7 to 15 percent slopes. The Sylvatus soil is to the right of the soil auger, and the Sylco soil is to the left of the auger. The marks on the auger are 10 inches apart.

according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

These soils are suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The soils are droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of the Sylvatus soil for

northern red oak is moderate. The estimated annual production of wood is 220 board feet per acre. The potential productivity of the Sylco soil for shortleaf pine is high. The estimated annual production of wood is 490 board feet per acre. Timber can be easily managed on these soils.

Community development is limited by the depth to bedrock and the slope. These soils are poorly suited to building site development and sanitary facilities.

The land capability classification is IVs.

28D—Sylvatus-Sylco complex, 15 to 35 percent slopes. These soils are moderately steep and steep and are well drained. They are on upland side slopes in the Blue Ridge province and on Lick Mountain. The shallow Sylvatus and moderately deep Sylco soils occur as areas so closely intermingled that mapping them separately was not practical. This map unit is about 45 percent Sylvatus soil, 35 percent Sylco soil, and 20 percent included soils. Areas range from 5 to 100 acres in size.

A typical profile of the Sylvatus soil has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 3 inches, brown channery silt loam

Subsoil:
3 to 7 inches, strong brown channery silt loam
7 to 15 inches, strong brown extremely channery silt loam

Substratum:
15 to 18 inches, mottled reddish yellow and very dark gray extremely channery silt loam

Bedrock:
18 inches, phyllite

A typical profile of the Sylco soil has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 3 inches, dark grayish brown channery silt loam

Subsurface layer:
3 to 7 inches, brown channery silt loam

Subsoil:
7 to 25 inches, yellowish brown very channery silt loam

Substratum:
25 to 35 inches, yellowish brown extremely channery silt loam

Bedrock:
35 inches, phyllite

Dekalb, Jefferson, and Matneflat soils are included in areas of this map unit. Dekalb soils are in landscape positions similar to those of the Sylvatus and Sylco soils. Jefferson and Matneflat soils are on foot slopes and benches.

Properties of the Sylvatus soil—

Permeability: Moderate
Available water capacity: Very low
Organic matter content: Low
Reaction: Extremely acid or very strongly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Fair
Depth to the seasonal high water table: More than 72 inches
Root zone: 10 to 20 inches
Depth to bedrock: 10 to 20 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

Properties of the Sylco soil—

Permeability: Moderate
Available water capacity: Low
Organic matter content: Low
Reaction: Very strongly acid or strongly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Fair
Depth to the seasonal high water table: More than 72 inches
Root zone: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

These soils are used mainly as woodland. A few areas are used for cultivated crops or for pasture.

These soils are generally unsuited to cultivated crops. The low or very low available water capacity, the slope, the acidity, and low natural fertility are the main limitations. The erosion potential is a management concern.

These soils are generally unsuited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant

nutrient management should include animal manure analysis and utilization.

These soils are generally unsuited to grasses and legumes for pasture. If the soils are used as pasture, grasses and legumes should cover a minimum of 70 percent of the surface. This plant cover is needed to control runoff and erosion. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The soils are droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of the Sylvatus soil for northern red oak is moderate. The estimated annual production of wood is 220 board feet per acre on north and east exposures and 180 board feet per acre on south and west exposures. The potential productivity of the Sylco soil for shortleaf pine is high on north and east exposures and moderately high on south and west exposures. The estimated annual production of wood is 490 board feet per acre on north and east exposures and 360 board feet per acre on south and west exposures. Windthrow and seedling mortality are limitations. The slope restricts the use of logging equipment. The erosion potential is a management concern, especially along logging roads and skid trails.

Community development is limited by the slope and the depth to bedrock. These soils are poorly suited to building site development and sanitary facilities.

The land capability classification is VIe.

28E—Sylvatus-Sylco complex, 35 to 65 percent slopes. These soils are steep and very steep and are well drained. They are on upland side slopes in the Blue Ridge province and on Lick Mountain. The shallow Sylvatus and moderately deep Sylco soils occur as areas so closely intermingled that mapping them separately was not practical. This map unit is about 45 percent Sylvatus soil, 35 percent Sylco soil, and 20 percent included soils. Areas range from 25 to 250 acres in size.

A typical profile of the Sylvatus soil has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 3 inches, brown channery silt loam

Subsoil:
3 to 7 inches, strong brown channery silt loam
7 to 15 inches, strong brown extremely channery silt loam

Substratum:
15 to 18 inches, mottled reddish yellow and very dark gray extremely channery silt loam

Bedrock:
18 inches, phyllite

A typical profile of the Sylco soil has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 3 inches, dark grayish brown channery silt loam

Subsurface layer:
3 to 7 inches, brown channery silt loam

Subsoil:
7 to 25 inches, yellowish brown very channery silt loam

Substratum:
25 to 35 inches, yellowish brown extremely channery silt loam

Bedrock:
35 inches, phyllite

Dekalb, Jefferson, and Matneflat soils are included in areas of this map unit. Dekalb soils are in landscape positions similar to those of the Sylvatus and Sylco soils. Jefferson and Matneflat soils are on colluvial foot slopes and benches.

Properties of the Sylvatus soil—

Permeability: Moderate
Available water capacity: Very low
Organic matter content: Low
Reaction: Extremely acid or very strongly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Fair
Depth to the seasonal high water table: More than 72 inches
Root zone: 10 to 20 inches
Depth to bedrock: 10 to 20 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

Properties of the Sylco soil—

Permeability: Moderate
Available water capacity: Low
Organic matter content: Low

Reaction: Very strongly acid or strongly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Fair
Depth to the seasonal high water table: More than 72 inches
Root zone: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

These soils are used mainly as woodland. A few areas are used as pasture.

These soils are generally unsuited to cultivated crops. The low or very low available water capacity, the slope, the acidity, and low natural fertility are limitations. The erosion potential is a management concern.

These soils are generally unsuited to grasses and legumes for pasture. If the soils are used as pasture, grasses and legumes should cover a minimum of 70 percent of the surface. This plant cover is needed to control runoff and erosion. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The soils are droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of the Sylvatus soil for northern red oak is moderate. The estimated annual production of wood is 220 board feet per acre on north and east exposures and 180 board feet per acre on south and west exposures. The potential productivity of the Sylco soil for shortleaf pine is high on north and east exposures and moderately high on south and west exposures. The estimated annual production of wood is 490 board feet per acre on north and east exposures and 360 board feet per acre on south and west exposures. Windthrow and seedling mortality are limitations. The slope restricts the use of logging equipment. The erosion potential is a management concern, especially along logging roads and skid trails.

Community development is limited by the slope and the depth to bedrock. These soils are poorly suited to building site development and sanitary facilities.

The land capability classification is VIIe.

29B—Timberville silt loam, 0 to 7 percent slopes, occasionally flooded. This soil is nearly level, very deep, and well drained. It is in low upland areas adjacent to drainageways in the Great Valley and is flooded for very brief periods. Areas range from about 5 to 25 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 5 inches, brown silt loam

Subsoil:
5 to 17 inches, yellowish brown silt loam

Buried surface layer:
17 to 28 inches, dark yellowish brown silt loam

Buried subsoil:
28 to 47 inches, yellowish brown silty clay loam
47 to 58 inches, yellowish brown silty clay loam mottled with yellow, dusky red, and white
58 to 72 inches, yellowish brown silt loam mottled with yellow and dusky red

Frederick, Marbie, and Wyrick soils are included in areas of this map unit. Marbie and Wyrick soils are at the head of drainageways, in depressions, and in saddles. Frederick soils are on convex side slopes. Soils that have a gravelly surface layer are included in some areas. Included soils make up about 20 percent of this unit.

Soil properties—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Moderate
Reaction: Extremely acid to moderately acid
Surface runoff: Moderate
Erosion potential: Medium
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Potential for frost action: Moderate
Flooding: Occasional, very brief

This soil is used mainly for cultivated crops, hay, or pasture. It is prime farmland.

This soil is well suited to cultivated crops, especially corn, small grain, and vegetables. Flooding can damage crops and delay planting and harvesting. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for hay. Hayland management includes crop rotations,

conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests.

The potential productivity of this soil for northern red oak is moderately high. The estimated annual production of wood is 360 board feet per acre. Timber can be easily managed on this soil.

Community development is limited by flooding, the potential for frost action, and restricted permeability. This soil is poorly suited to building site development and sanitary facilities.

The land capability classification is IIe.

30C—Timberville silt loam, 7 to 15 percent slopes, rarely flooded. This soil is sloping, very deep, and well drained. It is on upland foot slopes along intermittent drainageways in the Great Valley. Areas range from 5 to 150 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 5 inches, brown silt loam

Subsoil:
5 to 17 inches, yellowish brown silt loam

Buried surface layer:
17 to 28 inches, dark yellowish brown silt loam

Buried subsoil:
28 to 47 inches, yellowish brown silty clay loam
47 to 58 inches, yellowish brown silty clay loam mottled with yellow, dusky red, and white
58 to 72 inches, yellowish brown silt loam mottled with yellow and dusky red

Chiswell, Clubcaf, and Groseclose soils are included in areas of this map unit. Chiswell and Groseclose soils are on upland side slopes. Clubcaf soils are on flood plains. Soils that have a gravelly surface layer are included in some areas. Included soils make up about 20 percent of this unit.

Soil properties—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Moderate
Reaction: Extremely acid to moderately acid
Surface runoff: Rapid
Erosion potential: Medium
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Potential for frost action: Moderate
Flooding: Rare, very brief

This soil is used mainly for cultivated crops, hay, or pasture. Some areas are used as woodland.

This soil is suited to cultivated crops, especially corn, small grain, and vegetables. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, stripcropping, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests.

The potential productivity of this soil for northern red oak is moderately high. The estimated annual production of wood is 360 board feet per acre. Timber can be easily managed on this soil.

Community development is limited by the slope, flooding, restricted permeability, and the potential for frost action. This soil is poorly suited to building site development and sanitary facilities.

The land capability classification is IIIe.

31—Udorthents, nearly level. This map unit occurs as areas of ground limestone and soil material that remained in settling ponds after the removal of water. These areas are the result of mining activities in the Great Valley. They range from 5 to 50 acres in size.

Because the properties of the Udorthents vary, a typical profile is not described. The surface layer ranges from 0 to 10 inches in thickness and varies in color,

texture, and composition. The underlying material, which extends from a depth of a few inches to several feet, also varies in color, texture, and composition.

Areas of ground limestone are associated with abandoned lead and zinc mines at Austinville. The limestone is used for agricultural lime. Areas of soil material are associated with abandoned iron mines along Cripple Creek and the New River. They are used primarily for pasture, cultivated crops, or woodland.

Onsite investigation is necessary to determine the suitability of these soils for specific uses.

The land capability classification is VIII.

32—Udorthents-Urban land complex, nearly level to very steep. This map unit is in the Allegheny Mountains, the Great Valley, and the Blue Ridge province. The Udorthents are nearly level to very steep, shallow to very deep, and somewhat poorly drained to well drained. They are in areas that have been cut and filled. The Urban land is covered by highways, streets, parking lots, buildings, and other structures. The Udorthents and Urban land occur as areas so intermingled that mapping them separately was not practical. This unit is about 45 percent Udorthents, 30 percent Urban land, and 25 percent included soils. Areas range from 5 to 500 acres in size.

Because the properties of the Udorthents vary, a typical profile is not described. The surface layer ranges from 5 to 15 inches in thickness and varies in color, texture, and composition. The underlying material, which extends from a depth of a few inches to several feet, also varies in color, texture, and composition.

Onsite investigation is necessary to determine the suitability of this unit for specific uses.

The land capability classification is VIII.

33C—Urban land-Frederick complex, 0 to 25 percent slopes. This map unit is on upland summits, shoulder slopes, and side slopes in the Great Valley. The Frederick soil is nearly level to moderately steep and is well drained. The Urban land and Frederick soil occur as areas so closely intermingled that mapping them separately was not practical. This unit is about 50 percent Urban land, 30 percent Frederick soil, and 20 percent included soils. Areas range from 5 to 500 acres in size.

In the areas of Urban land, the soils have been altered by cutting and filling. In some areas as much as 30 feet of soil material has been added, all or part of the soil profile has been removed, or the soil has been covered by highways, buildings, concrete, asphalt, or other impervious material. The fill material is primarily from areas of the Frederick soil.

A typical profile of the Frederick soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, strong brown silt loam

Subsoil:
7 to 27 inches, yellowish red clay
27 to 57 inches, yellowish red clay mottled with reddish yellow
57 to 72 inches, yellowish red clay mottled with reddish yellow and dark red

Marbie, Timberville, and Wyrick soils are included in areas of this map unit. Marbie and Wyrick soils are in upland depressions and along drainageways. Timberville soils are on upland foot slopes and in low depressions along drainageways. Limestone crops out in some included areas.

Properties of the Frederick soil—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Low
Reaction: Very strongly acid to moderately acid
Surface runoff: Medium or rapid
Erosion potential: Medium or high
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Potential for frost action: Moderate

The parts of this map unit that are not covered by buildings, concrete, asphalt, or other impervious material include yards, gardens, and open areas around buildings, all of which vary in size.

Onsite investigation is necessary to determine suitability of the areas of Urban land for specific uses.

Community development is limited in areas of the Frederick soil by restricted permeability, the shrink-swell potential, low strength, and the slope. Low strength and the slope are limitations on sites for local roads and streets. These limitations can be overcome by properly designing the roads and streets and by strengthening or replacing the base material. The restricted permeability and the slope are limitations on sites for septic tank absorption fields. They can be overcome by installing the absorption fields on the contour and by enlarging the absorption area. The slope and the shrink-swell potential are limitations on sites for buildings. They can be overcome by properly designing the buildings and by strengthening the foundation.

No land capability classification is assigned.

34C—Urban land-Marbie-Timberville complex, 0 to 15 percent slopes. This map unit is along upland drainageways and in upland depressions in the Great Valley. The Marbie and Timberville soils are nearly level to sloping and are very deep. The Marbie soil is moderately well drained, and the Timberville soil is well drained. The Urban land and the Marbie and Timberville soils occur as areas so closely intermingled that mapping them separately was not practical. This unit is about 40 percent Urban land, 30 percent Marbie soil, 20 percent Timberville soil, and 10 percent included soils. Areas range from about 5 to 100 acres in size.

In the areas of Urban land, the soils have been altered by cutting and filling. In some areas as much as 30 feet of soil material has been added, all or part of the soil profile has been removed, or the soil has been covered by buildings, concrete, asphalt, or other impervious material. The fill material is primarily from areas of the Marbie and Timberville soils.

A typical profile of the Marbie soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 9 inches, brown silt loam

Subsoil:
9 to 21 inches, yellowish brown silt loam
21 to 46 inches, a fragipan of yellowish brown clay loam mottled with white
46 to 62 inches, yellowish brown clay loam mottled with light gray

A typical profile of the Timberville soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 5 inches, brown silt loam

Subsoil:
5 to 17 inches, yellowish brown silt loam

Buried surface layer:
17 to 28 inches, dark yellowish brown silt loam

Buried subsoil:
28 to 47 inches, yellowish brown silty clay loam
47 to 58 inches, yellowish brown silty clay loam mottled with yellow, dusky red, and white
58 to 72 inches, yellowish brown silt loam mottled with yellow and dusky red

Frederick and Wyrick soils are included in areas of this map unit. Frederick soils are on side slopes. Wyrick soils are in depressions and along drainageways. Limestone crops out in some included areas.

Properties of the Marbie soil—

Permeability: Slow
Available water capacity: Moderate
Organic matter content: Low
Reaction: Extremely acid to strongly acid in unlimed areas
Surface runoff: Rapid
Erosion potential: Medium
Tilth: Good
Depth to the seasonal high water table: 24 to 48 inches
Root zone: 18 to 36 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Potential for frost action: High

Properties of the Timberville soil—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Moderate
Natural fertility: Medium
Reaction: Extremely acid to moderately acid
Surface runoff: Medium
Erosion potential: Medium
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Potential for frost action: Moderate

The parts of this map unit that are not covered by buildings, concrete, asphalt, or other impervious material include yards, gardens, and open areas around buildings, all of which vary in size.

Onsite investigation is necessary to determine suitability of the areas of Urban land for specific uses.

Community development is limited in areas of the Marbie soil by restricted permeability, the shrink-swell potential, low strength, wetness, and the potential for frost action. Low strength and the potential for frost action are limitations on sites for local roads and streets. These limitations can be overcome by strengthening or replacing the base material. The restricted permeability and the wetness are limitations on sites for septic tank absorption fields. These limitations can be overcome by enlarging the absorption area. The wetness and the shrink-swell potential are limitations on sites for buildings. They can be overcome by installing drains around footings and by strengthening the foundation.

Community development is limited in areas of the Timberville soil by flooding, restricted permeability, and the potential for frost action. This soil is poorly suited to building site development and sanitary facilities.

No land capability classification is assigned.

35C—Weikert-Berks complex, 7 to 15 percent slopes. These soils are sloping and well drained. They are on upland summits, shoulder slopes, and side slopes in the Allegheny Mountains. The shallow Weikert and moderately deep Berks soils occur as areas so closely intermingled that mapping them separately was not practical. This map unit is about 50 percent Weikert soil, 30 percent Berks soil, and 20 percent included soils. Areas range from 5 to 50 acres in size.

A typical profile of the Weikert soil has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 6 inches, brown channery silt loam

Subsoil:
6 to 12 inches, brownish yellow very channery silt loam

Bedrock:
12 inches, shale

A typical profile of the Berks soil has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 4 inches, dark brown channery silt loam

Subsoil:
4 to 11 inches, light yellowish brown channery silt loam
11 to 19 inches, yellowish brown very channery silt loam

Substratum:
19 to 27 inches, yellowish brown extremely channery silt loam

Bedrock:
27 inches, shale

Lily, Jefferson, and Rayne soils are included in areas of this map unit. Lily and Rayne soils are in landscape positions similar to those of the Weikert and Berks soils. Jefferson soils are on colluvial foot slopes and benches. Soils that have a stony surface layer are included in some areas.

Properties of the Weikert soil—

Permeability: Moderately rapid
Available water capacity: Very low
Organic matter content: Moderate
Reaction: Very strongly acid to moderately acid in the surface layer and extremely acid to moderately acid in the subsoil and substratum
Surface runoff: Rapid
Erosion potential: High
Tilth: Poor
Depth to the seasonal high water table: More than 72 inches
Root zone: 10 to 20 inches
Depth to bedrock: 10 to 20 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

Properties of the Berks soil—

Permeability: Moderately rapid
Available water capacity: Very low
Organic matter content: Moderate
Reaction: Extremely acid to slightly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Fair
Depth to the seasonal high water table: More than 72 inches
Root zone: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Potential for frost action: Low

These soils are used mainly as woodland. A few areas are used for cultivated crops or for pasture.

These soils are poorly suited to cultivated crops. The very low available water capacity, the acidity, and low natural fertility are the main limitations. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, stripcropping, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

These soils are suited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

These soils are suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The

soils are droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of the Weikert soil for northern red oak is moderate. The estimated annual production of wood is 220 board feet per acre. The potential productivity of the Berks soil for northern red oak is moderately high. The estimated annual production of wood is 280 board feet per acre. Timber can be easily managed on these soils.

Community development is limited on the Weikert soil by the depth to bedrock and the slope. This soil is poorly suited to building site development and sanitary facilities.

Community development is limited on the Berks soil by the depth to bedrock and the slope. This soil is suited to building site development and sanitary facilities. The slope is a limitation on sites for local roads and streets. It can be overcome by properly designing the roads and streets. The depth to bedrock and the slope are limitations on sites for septic tank absorption fields. These limitations can be overcome by installing the absorption fields on the contour and by enlarging the absorption area or designing a special system. The slope and the depth to bedrock are limitations on sites for buildings. They can be overcome by properly designing the buildings.

The land capability classification is IVs.

35D—Weikert-Berks complex, 15 to 35 percent slopes. These soils are moderately steep and steep and are well drained. They are on upland side slopes in the Allegheny Mountains. The shallow Weikert and moderately deep Berks soils occur as areas so closely intermingled that mapping them separately was not practical. This map unit is about 50 percent Weikert soil, 30 percent Berks soil, and 20 percent included soils. Areas range from 5 to 100 acres in size.

A typical profile of the Weikert soil has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 6 inches, brown channery silt loam

Subsoil:
6 to 12 inches, brownish yellow very channery silt loam

Bedrock:
12 inches, shale

A typical profile of the Berks soil has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 4 inches, dark brown channery silt loam

Subsoil:
4 to 11 inches, light yellowish brown channery silt loam
11 to 19 inches, yellowish brown very channery silt loam

Substratum:
19 to 27 inches, yellowish brown extremely channery silt loam

Bedrock:
27 inches, shale

Lily, Jefferson, and Rayne soils are included in areas of this map unit. Lily and Rayne soils are in landscape positions similar to those of the Weikert and Berks soils. Jefferson soils are on colluvial foot slopes and benches. Soils that have a stony surface layer are included in some areas.

Properties of the Weikert soil—

Permeability: Moderately rapid
Available water capacity: Very low
Organic matter content: Moderate
Reaction: Very strongly acid to moderately acid in the surface layer and extremely acid to moderately acid in the subsoil and substratum
Surface runoff: Rapid
Erosion potential: High
Tilth: Poor
Depth to the seasonal high water table: More than 72 inches
Root zone: 10 to 20 inches
Depth to bedrock: 10 to 20 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

Properties of the Berks soil—

Permeability: Moderately rapid
Available water capacity: Very low
Organic matter content: Moderate
Reaction: Extremely acid to slightly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Fair
Depth to the seasonal high water table: More than 72 inches
Root zone: 20 to 40 inches
Depth to bedrock: 20 to 40 inches

Shrink-swell potential: Low
Potential for frost action: Low

These soils are used mainly as woodland. A few areas are used for cultivated crops or for pasture.

These soils are generally unsuited to cultivated crops. The very low available water capacity, the slope, the acidity, and low natural fertility are limitations. The erosion potential is a management concern.

These soils are generally unsuited to grasses and legumes for hay. Hayland management includes crop rotations, conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

These soils are generally unsuited to grasses and legumes for pasture. If the soils are used as pasture, grasses and legumes should cover a minimum of 70 percent of the surface. This plant cover is needed to control runoff and erosion. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The soils are droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of the Weikert soil for northern red oak is moderate. The estimated annual production of wood is 220 board feet per acre on north and east exposures and 180 board feet per acre on south and west exposures. The potential productivity of the Berks soil for northern red oak is moderately high on north and east exposures and moderate on south and west exposures. The estimated annual production of wood is 280 board feet per acre on north and east exposures and 240 board feet per acre on south and west exposures. The slope restricts the use of logging equipment. The erosion potential is a management concern, especially along logging roads and skid trails.

Community development is limited by the slope and the depth to bedrock. These soils are poorly suited to building site development and sanitary facilities.

The land capability classification is VIe.

35E—Weikert-Berks complex, 35 to 65 percent slopes. These soils are steep and very steep and are well drained. They are on upland side slopes in the Allegheny Mountains. The shallow Weikert and moderately deep Berks soils occur as areas so closely intermingled that mapping them separately was not practical. This map unit is about 50 percent Weikert soil, 30 percent Berks soil, and 20 percent included soils. Areas range from 5 to 100 acres in size.

A typical profile of the Weikert soil has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 6 inches, brown channery silt loam

Subsoil:
6 to 12 inches, brownish yellow very channery silt loam

Bedrock:
12 inches, shale

A typical profile of the Berks soil has the following sequence of layers, textures, and colors—

Organic layer:
2 inches to 0, partially decomposed and undecomposed leaves and twigs

Surface layer:
0 to 4 inches, dark brown channery silt loam

Subsoil:
4 to 11 inches, light yellowish brown channery silt loam
11 to 19 inches, yellowish brown very channery silt loam

Substratum:
19 to 27 inches, yellowish brown extremely channery silt loam

Bedrock:
27 inches, shale

Lily, Jefferson, and Rayne soils are included in areas of this map unit. Lily and Rayne soils are in landscape positions similar to those of the Weikert and Berks soils. Jefferson soils are on colluvial foot slopes and side slopes. Soils that have a stony surface layer are included in some areas.

Properties of the Weikert soil—

Permeability: Moderately rapid
Available water capacity: Very low
Organic matter content: Moderate
Reaction: Very strongly acid to moderately acid in the surface layer and extremely acid to moderately acid in the subsoil and substratum
Surface runoff: Rapid
Erosion potential: High
Tilth: Poor

Depth to the seasonal high water table: More than 72 inches
Root zone: 10 to 20 inches
Depth to bedrock: 10 to 20 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

Properties of the Berks soil—

Permeability: Moderately rapid
Available water capacity: Very low
Organic matter content: Moderate
Reaction: Extremely acid to slightly acid
Surface runoff: Rapid
Erosion potential: High
Tilth: Fair
Depth to the seasonal high water table: More than 72 inches
Root zone: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Potential for frost action: Low

These soils are used mainly as woodland. A few areas are used as pasture.

These soils are generally unsuited to cultivated crops. The very low available water capacity, the slope, the acidity, and low natural fertility are the main limitations. The erosion potential is a management concern.

These soils are generally unsuited to grasses and legumes for pasture. If the soils are used as pasture, grasses and legumes should cover a minimum of 70 percent of the surface. This plant cover is needed to control runoff and erosion. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests. The soils are droughty. Drought-tolerant forage species should be selected for planting.

The potential productivity of the Weikert soil for northern red oak is moderate. The estimated annual production of wood is 220 board feet per acre on north and east exposures and 180 board feet per acre on south and west exposures. The potential productivity of the Berks soil for northern red oak is moderately high on north and east exposures and moderate on south and west exposures. The estimated annual production of wood is 280 board feet per acre on north and east exposures and 240 board feet per acre on south and west exposures. The slope restricts the use of logging equipment. The erosion potential is a management concern, especially along logging roads and skid trails.

Community development is limited by the slope and the depth to bedrock. These soils are poorly suited to building site development and sanitary facilities.

The land capability classification is VIIe.

36B—Wheeling loam, 2 to 7 percent slopes. This soil is gently sloping, very deep, and well drained. It is on stream terraces in the Great Valley. Areas range from 5 to 75 acres in size.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 9 inches, dark yellowish brown loam

Subsoil:
9 to 31 inches, strong brown silty clay loam
31 to 65 inches, strong brown very fine sandy loam

Frederick, Sindion, and Speedwell soils are included in areas of this map unit. Frederick soils are on upland side slopes. Sindion and Speedwell soils are on flood plains. Soils that have a gravelly surface layer and moderately well drained soils are included in some areas. Included soils make up about 20 percent of this unit.

Soil properties—

Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Moderate
Reaction: Strongly acid or moderately acid
Surface runoff: Slow
Erosion potential: Medium
Tilth: Good
Depth to the seasonal high water table: More than 72 inches
Root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Potential for frost action: Moderate

This soil is used mainly for cultivated crops, hay, or pasture. It is prime farmland.

This soil is well suited to cultivated crops, especially corn, small grain, and vegetables. The erosion potential is a management concern. Runoff and erosion can be controlled by contour farming, no-till planting, grassed waterways, and crop rotations that include grasses and legumes. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for hay. Hayland management includes crop rotations,

conventional and no-till planting, and contour farming. Yields can be increased by applying lime and fertilizer according to the results of soil tests. Plant nutrient management should include animal manure analysis and utilization.

This soil is well suited to grasses and legumes for pasture. Pasture management includes maintaining a mixture of grasses and legumes, rotating pastures, deferring grazing, controlling weeds, and using proper stocking rates. Yields can be increased by applying lime and fertilizer according to the results of soil tests.

The potential productivity of this soil for northern red oak is moderately high. The estimated annual production of wood is 360 board feet per acre. Timber can be easily managed on this soil.

Community development is limited by restricted permeability, the potential for frost action, and low strength. This soil is suited to building site development and sanitary facilities. The potential for frost action and low strength are limitations on sites for local roads and streets. These limitations can be overcome by strengthening or replacing the base material. The restricted permeability is a limitation on sites for septic tank absorption fields. It can be overcome by enlarging the absorption field.

The land capability classification is IIe.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by The U.S. Department of Agriculture, is the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban or built-up land or water areas. It either is used for food or fiber crops or is available for those crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal expenditure of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Soil Conservation Service.

About 21,260 acres in the survey area, or nearly 9 percent of the total acreage, meets the soil requirements for prime farmland. This land is mainly in the Great Valley.

The map units in the survey area that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Some soils that have a seasonal high water table and all soils that are frequently flooded during the growing season qualify for prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. The need for these measures is indicated after the map unit name in table 5. Onsite evaluation is needed to determine whether or not these limitations have been overcome by corrective measures.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Fred Rogers, district conservationist, Soil Conservation Service, prepared this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

The farms in Wythe County have decreased in number and increased in size since 1960. Livestock and forage production are the main sources of income on these farms. The main types of livestock are beef and dairy cattle. Other types include hogs and sheep. The main forage crops are mixed grass-legume hay and alfalfa hay. Corn is grown mainly for silage. Grain and specialty crops are grown in small areas. Grain crops include corn, oats, and wheat. Specialty crops include tobacco, strawberries, peppers, cabbage, Christmas trees, and orchard crops (fig. 12).

Soil and water conservation practices are necessary on almost all of the cropland in the county. The most common conservation practices are conservation tillage, stripcropping, crop rotations that include grasses and legumes, winter cover crops, grassed waterways, and diversions. The most common system of conservation tillage is no-till planting. Rye is the primary cover crop in areas where no-till corn is grown.

The slope, stoniness, and the depth to bedrock limit many areas to less intensive uses, such as hay and pasture. Grass-clover hay is the primary hay crop, but alfalfa has made a comeback since the early 1960's, when it was almost eliminated by the weevil. No-till alfalfa has been particularly successful. The grasses grown for hay in the county are mainly orchardgrass and fescue mixed with red clover. The pastures dominantly support cool-season grasses, such as bluegrass, orchardgrass, and fescue. Pastures in areas where access to farm machinery is limited tend to support native grasses, including warm-season varieties, such as broom sedge and bluestems.

Many farmers use their grassland for both hay and

Figure 12.—Apple trees in an area of Frederick silt loam, 7 to 15 percent slopes.

pasture. This dual use is most common in areas where fescue is stockpiled for winter grazing. One or two hay cuttings are made in the spring, additional nitrogen fertilizer is applied in August, and cattle graze the accumulated growth during the winter. Another common dual use is one in which cattle are allowed to graze the regrowth after a first cutting of orchardgrass.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop

varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have slight limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce. The number 1 indicates low potential productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic

substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; and *F*, a high content of rock fragments in the soil. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, fire lanes, and log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope and the erosion factor K, which is shown in table 15. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment or season of use is not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *productivity class*. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *productivity class*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic meters per hectare per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand. One cubic meter per hectare equals 14.3 cubic feet per acre.

The first species listed under *common trees* for a soil is the indicator species for that soil. It is the dominant species on the soil and the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Recreation

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent

and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil

moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, timothy, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggartick, quackgrass, and ragweed.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, birch, cherry, maple, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are gray dogwood, autumn olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, yew, cedar, and hemlock.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, arrowhead, burreed, pickerelweed, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, swamps, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, meadow vole, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, frogs, and tree swallow.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure

aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreation uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the "Glossary."

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost-action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 11 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and

limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water

table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and depth to the water table is less than 1 foot. These soils may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes

of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, toxic substances, such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the "Glossary."

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as Pt. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3

inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓ bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil

to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 16, the first letter is for areas where bedrock is cracked and pervious and the second is for areas where the bedrock is impervious or where exposed bedrock makes up more than 25 percent of the surface.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable period of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely, thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that are characteristic of soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a

seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely, grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table, that is, perched or apparent; and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(4)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 17 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udult (*Ud*, meaning humid, plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludults (*Hapl*, meaning minimal horizonation, plus *udult*, the suborder of the Ultisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generallly, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, mesic Typic Hapludults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(3)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(4)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Austinville Series

The Austinville series consists of very deep, well drained, moderately permeable soils on uplands. These soils formed in residuum of dolomitic limestone. Slopes range from 2 to 45 percent.

Austinville soils are associated with Frederick, Hagerstown, and Shottower soils. Their subsoil is redder than that of Frederick and Hagerstown soils, and their surface layer is darker than that of Shottower soils.

Typical profile of Austinville silty clay loam, 7 to 15 percent slopes, about 0.6 mile east 103 degrees of the junction of Virginia 619 and Virginia 626 and 1.1 miles west 260 degrees of the junction of Virginia 611 and Virginia 626:

Ap—0 to 8 inches; dusky red (2.5YR 3/2) silty clay loam; moderate fine and very fine granular structure; friable, sticky and slightly plastic; many fine and medium roots; about 5 percent rock fragments; slightly acid; abrupt smooth boundary.

Bt1—8 to 22 inches; dark reddish brown (2.5YR 3/4) clay; moderate fine and medium subangular blocky structure; friable, sticky and plastic; many fine and few medium roots; many distinct clay films on faces of peds; few black manganese concretions; about 3 percent rock fragments; neutral; diffuse smooth boundary.

Bt2—22 to 36 inches; dark reddish brown (2.5YR 3/4) clay; moderate fine and very fine subangular blocky structure; friable, sticky and plastic; few fine and medium roots; many distinct clay films on faces of peds; many black manganese concretions; about 2 percent rock fragments; strongly acid; gradual smooth boundary.

Bt3—36 to 61 inches; dark reddish brown (2.5YR 3/4) clay; moderate very fine and fine subangular blocky structure; firm, sticky and plastic; few fine and medium roots; many distinct clay films on faces of peds; common black manganese concretions; about 2 percent rock fragments; very strongly acid; diffuse smooth boundary.

Bt4—61 to 79 inches; dark reddish brown (2.5YR 3/4) clay; moderate fine subangular blocky structure; firm, sticky and plastic; many distinct clay films on faces of peds; common black manganese concretions; about 2 percent rock fragments; very strongly acid.

The thickness of the solum and the depth to bedrock are more than 60 inches. The content of gravel and cobbles ranges from 0 to 10 percent in the A, Ap, and Bt horizons. Reaction ranges from very strongly acid to neutral.

Some pedons have an A horizon, and others have an Ap horizon. These horizons have hue of 2.5YR or 5YR, value of 2 or 3, and chroma of 2 to 4. They are loam, silt loam, silty clay loam, silty clay, or clay.

The Bt horizon has hue of 10R or 2.5YR, value of 3, and chroma of 4 to 6. It is silty clay loam, silty clay, or clay.

Berks Series

The Berks series consists of moderately deep, well drained, moderately permeable and moderately rapidly permeable soils on uplands. These soils formed in residuum of shale interbedded with siltstone and sandstone. Slopes range from 7 to 65 percent.

Berks soils are associated with Rayne and Weikert soils. They are shallower over bedrock than Rayne soils and deeper over bedrock than Weikert soils.

Typical profile of Berks channery silt loam, in an area of Rayne-Berks complex, 35 to 60 percent slopes; about 0.4 mile west 278 degrees of the junction of Interstate 81 and the Wythe County line and 0.3 mile north 343 degrees of the junction of Interstate 81 and Little Pine Run:

Oi—2 inches to 0; partially decomposed and undecomposed leaves and twigs.

A—0 to 4 inches; dark brown (10YR 4/3) channery silt loam; moderate fine granular structure; friable, slightly sticky and slightly plastic; about 20 percent channers; strongly acid; abrupt smooth boundary.

Bw1—4 to 11 inches; light yellowish brown (10YR 6/4) channery silt loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films; about 30 percent channers; very strongly acid; clear smooth boundary.

Bw2—11 to 19 inches; yellowish brown (10YR 5/6) very channery silt loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; about 55 percent channers; very strongly acid; clear smooth boundary.

C—19 to 27 inches; yellowish brown (10YR 5/6) extremely channery silt loam; massive; friable, slightly sticky and slightly plastic; about 70 percent channers; very strongly acid; diffuse wavy boundary.

R—27 inches; shale bedrock.

The thickness of the solum ranges from 12 to 40 inches. The depth to bedrock ranges from 20 to 40 inches. The content of gravel and channers ranges from 15 to 50 percent in the A and Ap horizons, from 15 to 75 percent in the Bw horizon, and from 35 to 90 percent in the C horizon. Reaction ranges from extremely acid to slightly acid unless the soils are limed.

The A horizon, if it occurs, has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. It is loam or silt loam in the fine-earth fraction.

The Ap horizon, if it occurs, has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is loam or silt loam in the fine-earth fraction.

The Bw horizon has hue of 5YR to 2.5Y, value of 4

to 6, and chroma of 3 to 8. It is loam, silt loam, or silty clay loam in the fine-earth fraction.

The C horizon has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 8. It is loam or silt loam in the fine-earth fraction.

Botetourt Series

The Botetourt series consists of very deep, moderately well drained, moderately permeable soils on stream terraces. These soils formed in alluvium derived from limestone, shale, siltstone, and sandstone. Slopes range from 2 to 7 percent.

Botetourt soils are associated with Derroc, Gullion, Ingledove, and Nomberville soils. They contain more sand than Gullion soils and are wetter than Derroc, Ingledove, and Nomberville soils.

Typical profile of Botetourt silt loam, 2 to 7 percent slopes, about 1.0 mile north 358 degrees of the intersection of Interstate 81 and Virginia 680 and 1.25 miles southwest 224 degrees of the intersection of Virginia 680 and Virginia 625:

Ap—0 to 9 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine granular structure; friable, slightly sticky and slightly plastic; many fine and medium roots; about 2 percent gravel; strongly acid; abrupt smooth boundary.

Bt1—9 to 23 inches; yellowish brown (10YR 5/6) clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; many fine and medium roots; few faint clay films on faces of peds; about 2 percent gravel; strongly acid; clear smooth boundary.

Bt2—23 to 47 inches; yellowish brown (10YR 5/6) clay loam; many distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine roots; common faint clay films on faces of peds; about 2 percent gravel; strongly acid; clear smooth boundary.

BC—47 to 52 inches; mottled yellowish brown (10YR 5/8) and light brownish gray (10YR 6/2) loam; weak medium subangular structure; friable, slightly sticky and nonplastic; few fine roots; few faint clay bridges and clay films on sand grains; about 2 percent gravel; strongly acid; clear smooth boundary.

C—52 to 72 inches; mottled yellowish brown (10YR 5/8) and light brownish gray (10YR 6/2) loam; massive; friable, nonsticky and nonplastic; about 10 percent gravel; strongly acid.

The thickness of the solum ranges from 40 to more than 60 inches. The depth to bedrock is more than 60 inches. The content of rounded gravel and cobbles ranges from 0 to 15 percent in the Ap horizon, from 0 to 35 percent in the Bt and BC horizons, and from 5 to 50 percent in the C horizon. Reaction ranges from strongly acid to slightly acid unless the soils are limed.

The Ap horizon has hue of 10YR, value of 4 to 6, and chroma of 2 to 4. It is fine sandy loam, loam, or silt loam.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is mottled in shades of gray, red, or brown in the lower part. This horizon is loam, sandy clay loam, or clay loam in the fine-earth fraction.

The BC horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 8. It is loam, sandy clay loam, or clay loam in the fine-earth fraction.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 1 to 8. It sandy loam, fine sandy loam, loam, or clay loam in the fine-earth fraction.

Chiswell Series

The Chiswell series consists of shallow, well drained, moderately permeable soils on uplands. These soils formed in residuum of a heterogeneous mixture of shale, siltstone, and fine grained sandstone. Slopes range from 7 to 60 percent.

Chiswell soils are associated with Groseclose, Litz, Shottower, and Timberville soils. They are shallower over bedrock than the associated soils.

Typical profile of Chiswell very channery silt loam, in an area of Chiswell-Groseclose-Litz complex, 15 to 30 percent slopes; about 0.5 mile southeast 137 degrees of the junction of Virginia 619 and Virginia 629 and 1.5 miles east 88 degrees of the junction of Virginia 627 and Virginia 628:

Oi—2 inches to 0; partially decomposed and undecomposed leaves and twigs.

A—0 to 3 inches; dark reddish brown (5YR 3/3) very channery silt loam; weak fine granular structure; friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; about 45 percent channers; extremely acid; clear wavy boundary.

Bw—3 to 13 inches; reddish brown (5YR 4/3) very channery silt loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; common fine and medium roots; common faint silt coatings on channers; about 50 percent channers; extremely acid; clear smooth boundary.

Cr—13 to 72 inches; mottled yellowish red (5YR 5/6) and reddish brown (5YR 4/4), weathered shale that crushes to silt loam.

The thickness of the solum ranges from 5 to 19 inches. The depth to soft bedrock ranges from 10 to 20 inches. The content of channers ranges from 35 to 70 percent in the A and Ap horizons, from 35 to 80 percent in the Bw horizon, and from 45 to 90 percent in the C and Cr horizons. Reaction ranges from extremely acid to moderately acid unless the soils are limed.

The A horizon, if it occurs, has hue of 5YR to 10YR, value of 3 or 4, and chroma of 2 to 5. It is loam or silt loam in the fine-earth fraction.

The Ap horizon, if it occurs, has hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 5. It is loam or silt loam in the fine-earth fraction.

The Bw horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 6. It is loam, silt loam, clay loam, or silty clay loam in the fine-earth fraction.

The C horizon, if it occurs, has hue of 5YR to 5Y, value of 4 to 6, and chroma of 3 to 8. It is loam, silt loam, clay loam, or silty clay loam in the fine-earth fraction.

The Cr horizon is weathered interbedded shale, siltstone, and sandstone that crushes to loam, silt loam, clay loam, or silty clay loam in the fine-earth fraction. It has hue of 5YR to 5Y, value of 4 to 6, and chroma of 3 to 8.

Clubcaf Series

The Clubcaf series consists of very deep, poorly drained, moderately permeable soils on flood plains. These soils formed in alluvium derived from limestone, shale, siltstone, and sandstone. Slopes range from 0 to 3 percent.

Clubcaf soils are associated with Sindion, Speedwell, and Wheeling soils. They are wetter than the associated soils.

Typical profile of Clubcaf silt loam, 0 to 3 percent slopes, frequently flooded, about 0.3 mile southwest 240 degrees of the junction of Virginia 669 and Virginia 668 and 0.8 mile northwest 318 degrees of the junction of Virginia 651 and Virginia 669:

Ap—0 to 7 inches; dark brown (10YR 3/3) silt loam, brown (10YR 4/3) dry; many coarse faint dark grayish brown (10YR 4/2) and many coarse prominent yellowish red (5YR 4/6) mottles; moderate fine granular structure; friable, slightly sticky and slightly plastic; many fine and medium roots; moderately acid; abrupt smooth boundary.

Bg1—7 to 22 inches; very dark gray (10YR 3/1) silt loam, brown (10YR 4/3) dry; common medium prominent yellowish red (5YR 4/6) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; many fine and medium roots; about 2 percent gravel; moderately acid; gradual smooth boundary.

Bg2—22 to 41 inches; very dark gray (10YR 3/1) silt loam, brown (10YR 4/3) dry; common medium prominent yellowish red (5YR 4/6) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; common fine roots; about 2 percent gravel; moderately acid; gradual smooth boundary.

Cg—41 to 62 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; common medium faint brown (10YR 4/3) mottles; massive; friable, slightly sticky and slightly plastic; common fine roots; about 2 percent gravel; neutral.

The thickness of the solum ranges from 30 to more than 60 inches. The depth to bedrock is more than 60 inches. The content of rounded gravel ranges from 0 to 5 percent in the A, Ap, and Bg horizons and from 0 to 60 percent in the Cg horizon. Reaction ranges from moderately acid to mildly alkaline.

Some pedons have an A horizon, and others have an Ap horizon. These horizons have hue of 10YR to 5Y and value and chroma of 2 or 3. They are loam or silt loam.

The Bg horizon has hue of 10YR to 5Y or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 3. It is loam, silt loam, clay loam, or silty clay loam.

The Cg horizon has hue of 10YR to 5Y or is neutral in hue. It has value of 2 to 7 and chroma of 0 to 4. It is loamy sand, sandy loam, loam, silt loam, clay loam, or silty clay loam in the fine-earth fraction.

Dekalb Series

The Dekalb series consists of moderately deep, well drained, moderately rapidly permeable and rapidly permeable soils on uplands. These soils formed in residuum of sandstone interbedded with shale. Slopes range from 7 to 65 percent.

Dekalb soils are associated with Drypond, Jefferson, Lily, and Matneflat soils. They are deeper over bedrock than Drypond soils, contain more rock fragments than Jefferson and Lily soils, and are shallower over bedrock than Matneflat soils.

Typical profile of Dekalb channery sandy loam, 35 to 65 percent slopes, about 0.7 mile south 182 degrees of the junction of Virginia 640 and Virginia 720 and 1.6 miles southwest 218 degrees of the junction of Virginia 720 and Virginia 649:

Oi—1 inch to 0; partially decomposed and undecomposed leaves and twigs.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) channery sandy loam; weak fine granular structure; friable, slightly sticky and nonplastic; about 30 percent gravel; strongly acid; clear wavy boundary.
E—3 to 9 inches; light yellowish brown (10YR 6/4) channery sandy loam; weak fine granular structure; friable, slightly sticky and nonplastic; about 30 percent gravel; strongly acid; clear wavy boundary.
Bw—9 to 20 inches; yellowish brown (10YR 5/4) very channery sandy loam; weak fine granular structure; friable, slightly sticky and nonplastic; about 45 percent gravel; very strongly acid; diffuse wavy boundary.
BC—20 to 28 inches; yellowish brown (10YR 5/6) very channery sandy loam; weak fine granular structure; friable, slightly sticky and nonplastic; about 45 percent gravel; very strongly acid; diffuse wavy boundary.
C—28 to 35 inches; yellowish brown (10YR 5/6) extremely channery sandy loam; massive; friable, slightly sticky and nonplastic; about 65 percent gravel; very strongly acid; clear wavy boundary.
R—35 inches; fractured sandstone bedrock.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. The content of channers ranges from 15 to 60 percent in the A, E, Bw, and BC horizons and from 50 to 90 percent in the C horizon. Reaction ranges from extremely acid to strongly acid unless the soils are limed.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is sandy loam or loam in the fine-earth fraction.

The E horizon has hue of 10YR, value of 5 or 6, and chroma of 1 to 4. It is sandy loam or loam in the fine-earth fraction.

The Bw and BC horizons have hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 4 to 8. They are sandy loam, fine sandy loam, or loam in the fine-earth fraction.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. It is loamy sand or sandy loam in the fine-earth fraction.

Derroc Series

The Derroc series consists of very deep, well drained, moderately rapidly permeable and rapidly permeable soils on flood plains. These soils formed in alluvium derived from sandstone and quartzite. Slopes range from 0 to 5 percent.

Derroc soils are associated with Botetourt, Gullion, Ingledove, and Nomberville soils. They contain more rock fragments in the subsoil than the associated soils.

Typical profile of Derroc cobbly sandy loam, 0 to 5 percent slopes, occasionally flooded, about 1.7 miles southwest 203 degrees of the junction of U.S. 21 and Virginia 619 and 1.5 miles southeast 161 degrees of the junction of Virginia 612 and Virginia 749:

Ap—0 to 6 inches; dark brown (10YR 3/3) cobbly sandy loam; weak fine granular structure; friable, slightly sticky and nonplastic; many fine, medium, and coarse roots; about 20 percent rock fragments; moderately acid; clear smooth boundary.
Bw—6 to 28 inches; strong brown (7.5YR 5/6) very cobbly sandy loam; weak fine granular structure; friable, slightly sticky and nonplastic; common fine, medium, and coarse roots; about 55 percent rock fragments; moderately acid; gradual wavy boundary.
C—28 to 61 inches; dark brown (7.5YR 4/4) extremely cobbly sandy loam; massive; friable, slightly sticky and nonplastic; common fine and medium roots; about 70 percent rock fragments; slightly acid.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 15 to 60 percent in the A and Ap horizons and from 30 to 80 percent in the Bw and C horizons. Reaction ranges from moderately acid to neutral unless the soils are limed.

The A horizon, if it occurs, has hue of 7.5YR or 10YR and value and chroma of 2 or 3. It is sandy loam, loam, or silt loam in the fine-earth fraction.

The Ap horizon, if it occurs, has hue of 7.5YR or 10YR, value of 2 to 5, and chroma of 2 to 4. It is sandy loam, loam, or silt loam in the fine-earth fraction.

The Bw horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 6. It is sandy loam or loam in the fine-earth fraction.

The C horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 to 6. It is loamy sand or sandy loam in the fine-earth fraction.

Drypond Series

The Drypond series consists of shallow, excessively drained, rapidly permeable soils on uplands. These soils formed in residuum of sandstone and quartzite. Slopes range from 10 to 65 percent.

Drypond soils are associated with Dekalb, Lily, and Matneflat soils. They are shallower over bedrock than the associated soils.

Typical profile of Drypond very gravelly sandy loam, in an area of Drypond-Rock outcrop complex, 10 to 65 percent slopes; about 1.5 miles east 97 degrees of the junction of U.S. 21 and Virginia 684 and 1.8 miles south

180 degrees of the junction of Virginia 640 and Virginia 696:

Oi—4 inches to 0; partially decomposed and undecomposed leaves and twigs.
A—0 to 2 inches; very dark grayish brown (10YR 3/2) very gravelly sandy loam; weak fine granular structure; friable, slightly sticky and slightly plastic; about 45 percent gravel; extremely acid; abrupt wavy boundary.
Bw—2 to 14 inches; yellowish brown (10YR 5/4) very gravelly sandy loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; about 40 percent gravel; extremely acid; gradual wavy boundary.
C—14 to 18 inches; yellowish brown (10YR 5/3) very gravelly sandy loam; weak fine granular structure; friable, slightly sticky and slightly plastic; about 50 percent gravel; extremely acid; clear wavy boundary.
R—18 inches; quartzite bedrock.

The thickness of the solum ranges from 10 to 18 inches. The depth to bedrock ranges from 10 to 20 inches. The content of gravel and channers ranges from 15 to 75 percent in the A horizon, from 25 to 80 percent in the Bw horizon, and from 45 to 90 percent in the C horizon. Reaction is extremely acid or very strongly acid unless the soils are limed.

The A horizon has hue of 10YR, value of 2 to 5, and chroma of 1 to 4. It is sandy loam or loam in the fine-earth fraction.

The Bw horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. It is sandy loam, loam, or sandy clay loam in the fine-earth fraction.

The C horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 to 8. It is sandy loam or loam in the fine-earth fraction.

Evansham Series

The Evansham series consists of very deep, poorly drained, slowly permeable soils on flood plains. These soils formed in alluvium derived from limestone, shale, siltstone, and sandstone. Slopes range from 0 to 2 percent.

Evansham soils are associated with Gullion, Nomberville, and Pagebrook soils. They are wetter than the associated soils.

Typical profile of Evansham silty clay loam, 0 to 2 percent slopes, frequently flooded, about 2.5 miles northeast 38 degrees of the Virginia State Police barracks and 1.8 miles northwest 322 degrees of the junction of Interstate 81 and U.S. 52:

Ap—0 to 7 inches; black (N 2/0) silty clay loam, dark gray (N 4/0) dry; strong very fine and fine granular structure; friable, sticky and plastic; many fine and medium roots; common cracks about ½ inch wide; about 2 percent gravel; slightly acid; abrupt smooth boundary.
Ag1—7 to 13 inches; black (10YR 2/1) silty clay, very dark gray (10YR 3/1) dry; many fine distinct yellowish brown (10YR 5/8) mottles; moderate coarse prismatic structure parting to moderate medium subangular blocky; firm, sticky and plastic; many fine and medium roots; common intersecting slickensides; common cracks about ½ inch wide; about 2 percent gravel; neutral; clear smooth boundary.
Ag2—13 to 22 inches; very dark gray (N 3/0) silty clay loam; common fine distinct brownish yellow (10YR 6/8) mottles; moderate coarse prismatic structure parting to strong fine and medium angular blocky; firm, sticky and plastic; many fine and medium roots; common intersecting slickensides; few cracks about ½ inch wide; about 2 percent gravel; neutral; clear wavy boundary.
Cg1—22 to 39 inches; gray (5Y 5/1) clay loam; many medium and coarse distinct light olive brown (2.5Y 5/6) mottles; massive; firm, sticky and plastic; many fine and medium roots; few intersecting slickensides; few cracks about ¼ inch wide; many clay flows on stress surfaces; about 2 percent gravel; slightly acid; clear smooth boundary.
Cg2—39 to 63 inches; gray (5Y 5/1) clay loam; many medium distinct light olive brown (2.5Y 5/6) mottles; massive; firm, sticky and plastic; few fine and medium roots; many clay flows on stress surfaces; about 2 percent gravel; slightly acid; gradual smooth boundary.
2Cg3—63 to 75 inches; dark gray (5Y 4/1) loam; massive; friable, sticky and slightly plastic; about 10 percent gravel; slightly acid.

Depth to the Cg horizon ranges from 15 to 40 inches. The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 0 to 5 percent in the Ap and Ag horizons and from 0 to 25 percent in the Cg and 2Cg horizons. Uncultivated areas have gilgai relief. Reaction ranges from slightly acid to mildly alkaline.

The Ap horizon has hue of 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 or 1. It is clay loam, silty clay loam, or silty clay.

The Ag horizon has hue of 10YR to 5Y or is neutral in hue. It has value of 2 or 3 and chroma of 0 or 1. It is clay loam, silty clay loam, silty clay, or clay.

The Cg horizon has hue of 10YR to 5Y or is neutral

in hue. It has value of 2 to 5 and chroma of 0 to 2. It is clay loam, silty clay loam, silty clay, or clay in the fine-earth fraction.

The 2Cg horizon has hue of 10YR to 5Y or is neutral in hue. It has value of 2 to 5 and chroma of 0 to 2. It is sandy loam, loam, sandy clay loam, silty clay loam, silty clay, or clay in the fine-earth fraction.

Frederick Series

The Frederick series consists of very deep, well drained, moderately permeable soils on uplands. These soils formed in residuum of limestone interbedded with shale, siltstone, and sandstone. Slopes range from 0 to 30 percent.

Frederick soils are associated with Austinville, Hagerstown, Marbie, Shottower, Timberville, and Wyrick soils. They are not so red as Austinville soils, have a lower base saturation than Hagerstown soils, contain more clay in the subsoil than Marbie and Wyrick soils, do not have the rounded rock fragments characteristic of Shottower soils, and do not have the buried horizons characteristic of Timberville soils.

Typical profile of Frederick silt loam, 2 to 7 percent slopes, about 1.5 miles west 259 degrees of the junction of U.S. 21 and Virginia 664 and 0.83 mile southeast 144 degrees of the junction of U.S. 21 and Virginia 680:

Ap—0 to 7 inches; strong brown (7.5YR 5/6) silt loam; moderate medium granular structure; friable, slightly sticky and slightly plastic; many fine roots; moderately acid; abrupt smooth boundary.

Bt1—7 to 27 inches; yellowish red (5YR 5/8) clay; moderate medium subangular blocky structure; firm, sticky and plastic; common fine roots; many distinct clay films on faces of peds; strongly acid; diffuse smooth boundary.

Bt2—27 to 57 inches; yellowish red (5YR 5/8) clay; many medium faint reddish yellow (7.5YR 6/8) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; many distinct clay films on faces of peds; very strongly acid; diffuse smooth boundary.

Bt3—57 to 72 inches; yellowish red (5YR 5/8) clay; many medium faint reddish yellow (7.5YR 6/8) and many medium distinct dark red (2.5YR 3/6) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; many distinct clay films on faces of peds; very strongly acid.

The solum is more than 60 inches thick. The depth to bedrock is more than 72 inches. The content of gravel ranges from 0 to 15 percent in the A, Ap, E, and Bt horizons. Reaction ranges from very strongly acid to moderately acid unless the soils are limed.

The A horizon, if it occurs, has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. It is loam or silt loam.

The Ap horizon, if it occurs, has hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 8. It is loam, silt loam, or silty clay loam.

The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 3 to 8. It is loam or silt loam.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8. It is silty clay loam, silty clay, or clay.

Groseclose Series

The Groseclose series consists of very deep, well drained, slowly permeable soils on uplands. These soils formed in residuum of a heterogeneous mixture of shale, siltstone, limestone, and fine grained sandstone. Slopes range from 7 to 60 percent.

Groseclose soils are associated with Chiswell, Litz, Shottower, and Timberville soils. They are deeper over bedrock than Chiswell and Litz soils, do not have the rounded rock fragments characteristic of Shottower soils, and do not have the buried horizons characteristic of Timberville soils.

Typical profile of Groseclose silt loam, in an area of Chiswell-Groseclose-Litz complex, 30 to 60 percent slopes; about 0.8 mile southeast 150 degrees of the junction of Virginia 690 and Virginia 602 and 0.9 mile northwest 346 degrees of the junction of Virginia 602 and Virginia 619:

A—0 to 8 inches; dark brown (10YR 4/3) silt loam; weak medium granular structure; friable, slightly sticky and slightly plastic; many fine, medium, and coarse roots; about 12 percent gravel; strongly acid; abrupt smooth boundary.

Bt1—8 to 28 inches; strong brown (7.5YR 5/6) clay; moderate medium subangular blocky structure; firm, sticky and plastic; common fine and medium roots; many prominent clay films on faces of peds; about 3 percent gravel; strongly acid; clear smooth boundary.

Bt2—28 to 42 inches; strong brown (7.5YR 4/6) clay; many medium faint reddish yellow (7.5YR 6/6) mottles; moderate medium subangular blocky structure; friable, sticky and plastic; few fine roots; common prominent clay films on faces of peds; about 2 percent gravel; very strongly acid; gradual smooth boundary.

C—42 to 72 inches; mottled reddish yellow (7.5YR 6/8)

and red (2.5YR 4/6) silt loam; massive; friable, slightly sticky and slightly plastic; few fine roots; few prominent clay flows in relict rock structure; about 10 percent gravel; very strongly acid.

The thickness of the solum ranges from 30 to 60 inches. The depth to bedrock is more than 60 inches. The content of gravel ranges from 0 to 15 percent in the A, Ap, Bt, and C horizons. Reaction ranges from extremely acid to strongly acid unless the soils are limed.

The A horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. It is fine sandy loam, loam, or silt loam.

The Ap horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 8. It is fine sandy loam, loam, or silt loam.

The Bt horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is sandy clay loam, clay loam, silty clay loam, silty clay, or clay.

The C horizon has hue of 2.5YR to 10YR, value of 4 to 8, and chroma of 3 to 8. It is sandy clay loam, clay loam, silty clay loam, silty clay, or clay.

Gullion Series

The Gullion series consists of very deep, moderately well drained, moderately permeable soils on flood plains. These soils formed in alluvium derived from limestone, shale, siltstone, and sandstone. Slopes range from 0 to 3 percent.

Gullion soils are associated with Botetourt, Derroc, Evansham, Nomberville, and Pagebrook soils. They contain more silt in the subsoil than Botetourt and Pagebrook soils, are better drained than Evansham soils, and are wetter than Derroc and Nomberville soils.

Typical profile of Gullion loam, 0 to 3 percent slopes, occasionally flooded, about 2.1 miles east 80 degrees of the junction of Virginia 680 and Virginia 666 and 2.2 miles northwest 330 degrees of the junction of U.S. 11 and Virginia 625:

Ap—0 to 10 inches; dark brown (10YR 3/3) loam, yellowish brown (10YR 5/4) dry; moderate fine granular structure; friable, slightly sticky and slightly plastic; many fine and medium roots; slightly acid; abrupt smooth boundary.

BA—10 to 23 inches; dark brown (10YR 3/3) clay loam, yellowish brown (10YR 5/4) dry; moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; common fine and medium roots; slightly acid; diffuse smooth boundary.

Bw—23 to 42 inches; dark yellowish brown (10YR 4/4) clay loam; common medium faint brown (10YR 5/3) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; neutral; diffuse smooth boundary.

Cg—42 to 62 inches; dark gray (5Y 4/1) clay loam; massive; friable, slightly sticky and slightly plastic; neutral.

The thickness of the solum ranges from 30 to more than 60 inches. The depth to bedrock is more than 60 inches. The content of rounded gravel and cobbles ranges from 0 to 5 percent in the A, Ap, and Bw horizons and from 0 to 60 percent in the Cg and C horizons. Reaction ranges from moderately acid to mildly alkaline.

Some pedons have an A horizon, and others have an Ap horizon. These horizons have hue of 7.5YR or 10YR and value and chroma of 2 or 3. They are loam or silt loam.

The upper part of the Bw horizon has hue of 7.5YR to 5Y or is neutral in hue. It has value of 3 to 7 and chroma of 0 to 4. The lower part has hue of 7.5YR to 5Y or is neutral in hue. It has value of 4 to 7 and chroma of 0 to 6. This horizon is loam, silt loam, clay loam, or silty clay loam.

The Cg horizon, if it occurs, has hue of 7.5YR to 5Y or is neutral in hue. It has value of 2 to 7 and chroma of 0 to 4. It is loamy sand, sandy loam, loam, silt loam, clay loam, or silty clay loam in the fine-earth fraction.

The C horizon, if it occurs, has hue of 7.5YR to 5Y, value of 2 to 7, and chroma of 1 to 4. It is loamy sand, sandy loam, loam, silt loam, clay loam, or silty clay loam in the fine-earth fraction.

Hagerstown Series

The Hagerstown series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in residuum of limestone interbedded with shale, siltstone, and sandstone. Slopes range from 2 to 45 percent.

Hagerstown soils are associated with Austinville, Frederick, Marbie, Timberville, Wurno, and Wyrick soils. They are shallower over bedrock than Austinville soils, have a higher base saturation than Frederick soils, are better drained than Marbie soils, do not have the buried horizons characteristic of Timberville soils, are deeper over bedrock than Wurno soils, and contain more clay in the subsoil than Wyrick soils.

Typical profile of Hagerstown silt loam, in an area of Hagerstown-Wurno complex, 15 to 30 percent slopes; about 0.6 mile southwest 195 degrees of the junction of Interstate 81 and Interstate 77 and 1.4 miles southeast 108 degrees of the junction of Interstate 81 and U.S. 52:

Ap—0 to 7 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine granular structure; friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; about 10 percent gravel; slightly acid; gradual smooth boundary.
Bt1—7 to 33 inches; strong brown (7.5YR 5/6) clay; many fine distinct reddish brown (5YR 4/4) and yellow (10YR 7/6) mottles; moderate fine and medium subangular blocky structure; friable, sticky and plastic; few very fine and fine roots; many distinct clay films on faces of peds; common black manganese concretions; strongly acid; diffuse wavy boundary.
Bt2—33 to 42 inches; yellowish red (5YR 5/6) clay; common fine distinct brownish yellow (10YR 6/6) mottles; moderate fine and medium subangular blocky structure; friable, sticky and plastic; many distinct clay films on faces of peds; common black manganese concretions; strongly acid; clear irregular boundary.
C—42 to 55 inches; strong brown (7.5YR 5/8) clay; many medium distinct brownish yellow (10YR 6/8) and yellowish red (5YR 5/6) mottles; massive; friable, sticky and plastic; many distinct clay flows; about 10 percent rock fragments; moderately acid; abrupt irregular boundary.
R—55 inches; interbedded limestone and calcareous shale bedrock.

The thickness of the solum and the depth to bedrock range from 40 to 60 inches. The content of gravel ranges from 0 to 15 percent in the A, Ap, Bt, and C horizons. Reaction ranges from strongly acid to slightly acid in the A and Ap horizons and in the upper part of the Bt horizon and from strongly acid to neutral in the lower part of the Bt horizon and in the C horizon.

The A horizon, if it occurs, has hue of 5YR to 10YR, value of 3, and chroma of 2 to 4. It is loam, silt loam, clay loam, or silty clay loam.

The Ap horizon, if it occurs, has hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 4. It is loam, silt loam, clay loam, or silty clay loam.

The Bt horizon has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 8. It is silty clay loam, silty clay, or clay.

The C horizon has hue of 2.5YR to 10YR, value of 3 to 6, and chroma of 4 to 8. It is loam, silt loam, clay loam, silty clay loam, silty clay, or clay.

Ingledove Series

The Ingledove series consists of very deep, well drained, moderately permeable soils on stream terraces. These soils formed in alluvium derived from limestone, sandstone, siltstone, and shale. Slopes range from 2 to 7 percent.

Ingledove soils are associated with Botetourt, Derroc, and Nomberville soils. They are better drained than Botetourt soils, have fewer rock fragments than Derroc soils, and have less silt than Nomberville soils.

Typical profile of Ingledove loam, 2 to 7 percent slopes, about 1.3 miles east 72 degrees of the junction of U.S. 21 and Virginia 619 and 0.8 mile northwest 302 degrees of the junction of Virginia 619 and Cripple Creek:

Ap—0 to 10 inches; dark yellowish brown (10YR 4/4) loam; weak medium granular structure; friable, slightly sticky and slightly plastic; many fine and medium roots; about 5 percent rounded gravel and cobbles; moderately acid; abrupt smooth boundary.
Bt1—10 to 22 inches; strong brown (7.5YR 5/6) sandy clay loam; many medium distinct reddish yellow (5YR 6/8) and pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; friable, sticky and plastic; many fine and medium roots; many distinct clay films on faces of peds; about 5 percent rounded gravel and cobbles; moderately acid; gradual smooth boundary.
Bt2—22 to 32 inches; strong brown (7.5YR 5/8) sandy clay loam; many medium distinct reddish yellow (5YR 6/8) and pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; friable, sticky and plastic; common fine and medium roots; many distinct clay films on faces of peds; about 5 percent rounded gravel and cobbles; moderately acid; clear smooth boundary.
Bt3—32 to 45 inches; brown (7.5YR 4/4) sandy clay loam; many medium distinct pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; common distinct clay films on faces of peds; about 12 percent rounded gravel and cobbles; moderately acid; clear smooth boundary.
C—45 to 72 inches; brown (7.5YR 4/4) very gravelly loam; many medium distinct very pale brown (10YR 7/3) mottles; massive; friable, slightly sticky and slightly plastic; common manganese concretions; about 45 percent rounded gravel and cobbles; moderately acid.

The thickness of the solum ranges from 30 to more than 60 inches. The depth to bedrock is more than 60 inches. The content of rounded gravel and cobbles ranges from 0 to 15 percent in the A and Ap horizons and in the upper part of the Bt horizon and from 0 to 60 percent in the lower part of the Bt horizon and in the C horizon. Reaction ranges from very strongly acid to

neutral in the A and Ap horizons and in the upper part of the Bt horizon and from moderately acid to neutral in the lower part of the Bt horizon and in the C horizon.

The A horizon, if it occurs, has hue of 5YR to 10YR and value and chroma of 2 or 3. It is sandy loam, fine sandy loam, loam, or silt loam.

The Ap horizon, if it occurs, has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 or 4. It is sandy loam, fine sandy loam, loam, or silt loam.

The Bt horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. It is loam, sandy clay loam, or clay loam in the fine-earth fraction.

The C horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. It is loamy sand, sandy loam, loam, sandy clay loam, or clay loam in the fine-earth fraction.

Jefferson Series

The Jefferson series consists of very deep, well drained, moderately rapidly permeable soils on uplands. These soils formed in colluvium derived from sandstone, quartzite, and shale. Slopes range from 7 to 60 percent.

Jefferson soils are associated with Dekalb, Lily, and Matneflat soils. They are deeper over bedrock than Dekalb and Lily soils and contain less clay in the subsoil than Matneflat soils.

Typical profile of Jefferson cobbly loam, 15 to 35 percent slopes, about 1.1 miles southeast 139 degrees of the junction of U.S. 21 and Virginia 619 and 1.2 miles northeast 80 degrees of the junction of U.S. 21 and Virginia 773:

Oi—2 inches to 0; partially decomposed and undecomposed leaves and twigs.

A—0 to 3 inches; dark brown (10YR 3/3) cobbly loam; moderate medium granular structure; friable, slightly sticky and slightly plastic; many fine, medium, and coarse roots; about 20 percent rock fragments; very strongly acid; clear wavy boundary.

E—3 to 10 inches; yellowish brown (10YR 5/4) loam; moderate medium granular structure; friable, slightly sticky and slightly plastic; many fine, medium, and coarse roots; about 10 percent rock fragments; very strongly acid; gradual smooth boundary.

Bt1—10 to 20 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; common distinct clay films on faces of peds; about 10 percent rock fragments; very strongly acid; gradual smooth boundary.

Bt2—20 to 30 inches; yellowish brown (10YR 5/8) loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; common distinct clay films on faces of peds; about 10 percent rock fragments; strongly acid; gradual smooth boundary.

BC—30 to 59 inches; strong brown (7.5YR 5/8) cobbly clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine and medium roots; many distinct clay films on faces of peds; about 25 percent rock fragments; strongly acid; clear smooth boundary.

C—59 to 68 inches; strong brown (7.5YR 5/8) cobbly loam; common medium distinct red (2.5YR 4/8) mottles; massive; friable, slightly sticky and slightly plastic; about 25 percent rock fragments; strongly acid.

The thickness of the solum ranges from 40 to more than 60 inches. The depth to bedrock is more than 60 inches. The content of gravel and cobbles ranges from 5 to 35 percent to a depth of about 40 inches and from 20 to 80 percent below that depth. Reaction is very strongly acid or strongly acid unless the soils are limed.

The A horizon, if it occurs, has hue of 10YR, value of 3 to 5, and chroma of 1 to 3. It is sandy loam, fine sandy loam, loam, or silt loam in the fine-earth fraction.

The Ap horizon, if it occurs, has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is sandy loam, fine sandy loam, loam, or silt loam in the fine-earth fraction.

The E horizon has hue of 10YR, value of 4 to 6, and chroma of 3 or 4. It is sandy loam, fine sandy loam, loam, or silt loam in the fine-earth fraction.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is sandy loam, loam, sandy clay loam, or clay loam in the fine-earth fraction.

The BC horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is sandy loam, fine sandy loam, loam, sandy clay loam, or clay loam in the fine-earth fraction.

The C horizon, if it occurs, has hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 8. It is sandy loam, fine sandy loam, loam, sandy clay loam, or clay loam in the fine-earth fraction.

The 2C horizon, if it occurs, has hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 8. It is sandy clay loam, silty clay loam, clay loam, or clay in the fine-earth fraction.

Lily Series

The Lily series consists of moderately deep, well drained, moderately rapidly permeable soils on uplands. These soils formed in residuum of sandstone and quartzite. Slopes range from 7 to 65 percent.

Lily soils are associated with Dekalb, Drypond, Jefferson, and Matneflat soils. They have fewer rock fragments than Dekalb soils, are deeper over bedrock than Drypond soils, and are shallower over bedrock than Jefferson and Matneflat soils.

Typical profile of Lily sandy loam, 35 to 65 percent slopes, about 0.9 mile northwest 278 degrees of the overpass of Interstate 81 and Virginia 625 and 1.0 mile southwest 239 degrees of the junction of Virginia 625 and Virginia 665:

Oi—2 inches to 0; partially decomposed and undecomposed leaves and twigs.
A—0 to 4 inches; brown (10YR 5/3) sandy loam; moderate fine granular structure; friable, slightly sticky and nonplastic; common fine and medium roots; about 5 percent gravel; very strongly acid; clear smooth boundary.
Bt—4 to 21 inches; strong brown (7.5YR 5/6) loam; weak fine granular structure; friable, slightly sticky and slightly plastic; common fine and medium roots; common faint clay bridges on sand grains; about 5 percent gravel; very strongly acid; clear smooth boundary.
C—21 to 28 inches; strong brown (7.5YR 5/6) loam; massive; friable, slightly sticky and slightly plastic; few fine roots; about 10 percent gravel; very strongly acid; gradual wavy boundary.
R—28 inches; sandstone bedrock.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. The content of gravel and channers ranges from 0 to 15 percent to a depth of 24 inches and from 0 to 35 percent below that depth. Reaction ranges from extremely acid to strongly acid unless the soils are limed.

The A horizon, if it occurs, has hue of 7.5YR or 10YR, value of 2 to 5, and chroma of 1 to 3. It is sandy loam, fine sandy loam, loam, or silt loam.

The Ap horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 4. It is sandy loam, fine sandy loam, loam, or silt loam.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is loam, sandy clay loam, or clay loam in the fine-earth fraction.

The C horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is loamy sand, sandy loam, fine sandy loam, loam, sandy clay loam, or clay loam in the fine-earth fraction.

Litz Series

The Litz series consists of moderately deep, well drained, moderately permeable soils on uplands. These soils formed in residuum of a heterogeneous mixture of shale, siltstone, limestone, and fine grained sandstone. Slopes range from 7 to 60 percent.

Litz soils are associated with Chiswell, Groseclose, Shottower, and Timberville soils. They are deeper over bedrock than Chiswell soils and are shallower over bedrock than Groseclose, Shottower, and Timberville soils.

Typical profile of Litz channery silt loam, in an area of Chiswell-Groseclose-Litz complex, 30 to 60 percent slopes; about 1.3 miles northwest 340 degrees of Speedwell Church and 0.5 mile northeast 60 degrees of the junction of Virginia 625 and Virginia 672:

A—0 to 7 inches; reddish brown (5YR 5/4) channery silt loam; weak fine granular structure; friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; about 22 percent channers; strongly acid; clear smooth boundary.
Bw/Bt—7 to 15 inches; reddish brown (5YR 4/4) very channery silt loam; irregularly shaped bodies and lenses of yellowish red (5YR 5/6) silty clay loam (Bt); weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; common fine and medium roots; common distinct clay films on faces of peds in the Bt part; about 40 percent channers; very strongly acid; clear smooth boundary.
C—15 to 35 inches; reddish brown (5YR 4/4) very channery silt loam; massive; friable, slightly sticky and slightly plastic; few fine roots; about 45 percent channers; very strongly acid; clear smooth boundary.
R—35 inches; red shale bedrock.

The thickness of the solum ranges from 10 to 30 inches. The depth to bedrock ranges from 20 to 40 inches. The content of gravel and channers ranges from 15 to 65 percent in the A and Ap horizons and from 35 to 90 percent in the Bw/Bt and C horizons. Some part of each pedon has a thin, discontinuous argillic horizon. Reaction is very strongly acid or strongly acid unless the soils are limed.

The A horizon, if it occurs, has hue of 5YR to 10YR, value of 3 to 6, and chroma of 2 to 6. It is loam or silt loam in the fine-earth fraction.

The Ap horizon, if it occurs, has hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 6. It is loam or silt loam in the fine-earth fraction.

The Bw/Bt horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. Each pedon has a Bw part that is loam or silt loam in the fine-earth fraction and a discontinuous Bt part that is loam, silt loam, or silty clay loam in the fine-earth fraction.

The C horizon has hue of 2.5YR to 5Y, value of 4 to

6, and chroma of 3 to 8. It is loam, silt loam, or silty clay loam in the fine-earth fraction.

Marbie Series

The Marbie series consists of very deep, moderately well drained, slowly permeable soils on uplands. These soils formed in colluvium and alluvium derived from limestone, shale, siltstone, and fine grained sandstone and in the underlying residuum of limestone and shale. Slopes range from 2 to 25 percent.

Marbie soils are associated with Frederick, Hagerstown, Timberville, Wurno, and Wyrick soils. Unlike the associated soils, they have a fragipan.

Typical profile of Marbie silt loam, in an area of Marbie-Wyrick complex, 7 to 15 percent slopes; about 1.3 miles northeast 72 degrees of the junction of U.S. 11 and Virginia 680 and about 300 feet north of U.S. 11:

Ap—0 to 9 inches; brown (10YR 4/3) silt loam; moderate fine and very fine granular structure; friable, slightly sticky and slightly plastic; common fine roots; few manganese concretions; about 2 percent gravel; very strongly acid; abrupt smooth boundary.

Bt—9 to 21 inches; yellowish brown (10YR 5/6) silt loam; moderate fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine roots; common faint clay films on faces of peds; few manganese concretions; about 5 percent gravel; very strongly acid; clear smooth boundary.

Btx—21 to 46 inches; yellowish brown (10YR 5/4) clay loam; many medium distinct white (10YR 8/2) mottles; moderate very thick platy structure parting to moderate medium subangular blocky; firm, compact, brittle in about 75 percent of the matrix, sticky and plastic; many distinct clay films on faces of peds; few manganese concretions; about 5 percent gravel; very strongly acid; gradual smooth boundary.

2Bt—46 to 62 inches; yellowish brown (10YR 5/6) clay loam; common medium distinct light gray (10YR 7/2) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; many distinct clay films on faces of peds; about 12 percent gravel; very strongly acid.

The thickness of the solum ranges from 40 to more than 72 inches. Depth to the Btx horizon ranges from 18 to 36 inches. The depth to bedrock is more than 60 inches. The content of gravel ranges from 0 to 15 percent in the A, Ap, and Bt horizons, from 0 to 35 percent in the Btx horizon, and from 0 to 25 percent in the 2Bt and 2C horizons. Reaction ranges from extremely acid to strongly acid unless the soils are limed.

The A horizon, if it occurs, has hue of 7.5YR or 10YR and value and chroma of 2 or 3. It is loam or silt loam.

The Ap horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. It is loam or silt loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. It is loam, silt loam, clay loam, or silty clay loam.

The Btx horizon has hue of 7.5YR to 2.5Y, value of 4 to 8, and chroma of 2 to 8. It is loam, silt loam, clay loam, or silty clay loam in the fine-earth fraction.

The 2Bt horizon has hue of 2.5YR to 10YR, value of 4 to 7, and chroma of 2 to 6. It is clay loam, silty clay loam, silty clay, or clay in the fine-earth fraction.

The 2C horizon, if it occurs, has hue of 2.5YR to 2.5Y, value of 4 to 7, and chroma of 2 to 6. It is loam, silt loam, clay loam, silty clay loam, silty clay, or clay in the fine-earth fraction.

Matneflat Series

The Matneflat series consists of very deep, well drained, moderately rapidly permeable soils on uplands. These soils formed in colluvium derived from sandstone, quartzite, and shale (fig. 13). Slopes range from 7 to 65 percent.

Matneflat soils are associated with Dekalb, Drypond, Jefferson, and Lily soils. They are deeper over bedrock than Dekalb, Drypond, and Lily soils and contain less clay than Jefferson soils.

Typical profile of Matneflat gravelly sandy loam, 15 to 35 percent slopes, stony, about 0.7 mile southeast 155 degrees of the junction of Virginia 640 and Virginia 720 and 1.5 miles southwest 207 degrees of the junction of Virginia 720 and Virginia 649:

Oi—2 inches to 0; partially decomposed and undecomposed leaves and twigs.

A—0 to 4 inches; brown (7.5YR 5/4) gravelly sandy loam; weak fine and medium granular structure; friable, slightly sticky and nonplastic; many fine, medium, and coarse roots; about 25 percent gravel; strongly acid; clear smooth boundary.

Bt1—4 to 21 inches; reddish yellow (7.5YR 6/6) sandy loam; weak medium subangular blocky structure; friable, slightly sticky and nonplastic; common fine, medium, and coarse roots; common distinct clay films and clay bridges on sand grains; about 10 percent gravel; strongly acid; clear smooth boundary.

Bt2—21 to 38 inches; strong brown (7.5YR 5/8) sandy loam; common medium faint reddish yellow (7.5YR 7/8) mottles; weak medium subangular blocky structure; friable, slightly sticky and nonplastic; common fine and medium roots; common distinct clay films and clay bridges on sand grains; about 10 percent gravel; strongly acid; clear smooth boundary.

BC—38 to 62 inches; mottled yellowish red (5YR 5/8), red (2.5YR 4/8), and yellowish brown (10YR 5/6) gravelly coarse sandy loam; weak coarse subangular blocky structure; friable, slightly sticky and nonplastic; few fine roots; common distinct clay films and clay bridges on sand grains; about 30 percent gravel; strongly acid.

The thickness of the solum and the depth to bedrock are more than 60 inches. The content of rock fragments ranges from 5 to 35 percent in the A and Ap horizons and in the upper part of the Bt horizon and from 0 to 50 percent in the lower part of the Bt horizon and in the BC horizon. Reaction ranges from extremely acid to strongly acid unless the soils are limed.

Some pedons have an A horizon, and others have an Ap horizon. These horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. They are sandy loam in the fine-earth fraction.

The Bt and BC horizons have hue of 5YR to 10YR, value of 5 or 6, and chroma of 4 to 8. They are coarse sandy loam, sandy loam, or loam in the fine-earth fraction.

Nomberville Series

The Nomberville series consists of very deep, well drained, moderately permeable soils on flood plains. These soils formed in alluvium derived from limestone, shale, siltstone, and sandstone. Slopes range from 0 to 3 percent.

Nomberville soils are associated with Botetourt, Derroc, Evansham, Gullion, and Ingledove soils. They are better drained than Botetourt, Evansham, and Gullion soils, have fewer rock fragments than Derroc soils, and have a surface layer that is darker than that of Ingledove soils.

Typical profile of Nomberville silt loam, 0 to 3 percent slopes, occasionally flooded, about 1.9 miles northeast 24 degrees of the Virginia State Police headquarters along Interstate 81 and 2.4 miles northwest 303 degrees of the junction of Interstate 81 and U.S. 52:

Ap—0 to 12 inches; dark brown (10YR 3/3) silt loam, brown (10YR 4/3) dry; moderate fine granular structure; friable, slightly sticky and slightly plastic; many fine, medium, and coarse roots; about 2 percent gravel; neutral; abrupt smooth boundary.

Bw1—12 to 21 inches; dark brown (10YR 3/3) silt loam, brown (10YR 4/3) dry; moderate fine and very fine subangular blocky structure; friable, slightly sticky and slightly plastic; many fine, medium, and coarse roots; common worm channels; about 2 percent gravel; neutral; gradual smooth boundary.

Bw2—21 to 41 inches; brown (10YR 5/3) silt loam; moderate fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine and medium roots; common worm

Figure 13.—Profile of a Matneflat gravelly sandy loam, which formed in colluvium derived from sandstone, quartzite, and shale.

channels; about 2 percent gravel; mildly alkaline; clear smooth boundary.
C—41 to 67 inches; brown (10YR 4/3) loam; massive; friable, slightly sticky and slightly plastic; few fine roots; many worm channels; about 2 percent gravel; mildly alkaline.

The thickness of the solum ranges from 30 to more than 60 inches. The depth to bedrock is more than 60 inches. The content of gravel ranges from 0 to 5 percent in the A, Ap, and Bw horizons and from 0 to 60 percent in the C horizon. Reaction ranges from moderately acid to moderately alkaline.

Some pedons have an A horizon, and others have an Ap horizon. These horizons have hue of 10YR or 2.5Y and value and chroma of 2 or 3. They are loam, silt loam, or silty clay loam.

The Bw horizon has hue of 7.5YR to 2.5Y. It generally has value of 4 or 5 and chroma of 3 or 4, but in some pedons it has value of 2 or 3 and chroma of 1 to 3 in the upper part. This horizon is silt loam or silty clay loam.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4. It is sandy loam, fine sandy loam, loam, silt loam, or silty clay loam in the fine-earth fraction.

Pagebrook Series

The Pagebrook series consists of very deep, moderately well drained, slowly permeable soils on flood plains. These soils formed in alluvium derived from limestone, shale, siltstone, and sandstone. Slopes range from 0 to 3 percent.

Pagebrook soils are commonly near Evansham and Gullion soils. They are better drained than Evansham soils and have more clay in the subsoil than Gullion soils.

Typical profile of Pagebrook silt loam, 0 to 3 percent slopes, rarely flooded, about 2 miles northeast 41 degrees of the Virginia State Police station and 1.8 miles northwest 305 degrees of the junction of Interstate 81 and U.S. 52:

Ap—0 to 8 inches; brown (7.5YR 4/4) silt loam; moderate fine and medium granular structure; firm, sticky and plastic; many fine and medium roots; common cracks more than ½ inch wide; about 2 percent gravel; neutral; abrupt smooth boundary.
Bw1—8 to 26 inches; dark brown (10YR 4/3) clay; moderate coarse prismatic structure parting to moderate medium angular blocky; firm, sticky and plastic; many fine and medium roots; common cracks about ½ inch wide; many black concretions; about 2 percent gravel; neutral; clear smooth boundary.
Bw2—26 to 34 inches; yellowish brown (10YR 5/4) clay; many medium faint grayish brown (10YR 5/2) mottles; moderate coarse prismatic structure parting to moderate medium angular blocky; firm, sticky and plastic; common fine roots; few cracks about ⅜ inch wide; many black concretions; about 2 percent gravel; neutral; clear wavy boundary.
Bw3—34 to 63 inches; mottled strong brown (7.5YR 5/8) and grayish brown (10YR 5/2) clay; weak medium subangular blocky structure; very firm, sticky and plastic; few fine roots; about 2 percent gravel; neutral.

The thickness of the solum ranges from 40 to more than 60 inches. The depth to bedrock is more than 60 inches. The content of gravel ranges from 0 to 10 percent in the Ap horizon and from 0 to 55 percent in the Bw and C horizons. Reaction ranges from strongly acid to mildly alkaline in the Ap horizon and in the upper part of the Bw horizon and from slightly acid to moderately alkaline in the lower part of the Bw horizon and in the C horizon.

The Ap horizon has hue of 7.5YR or 10YR, value of 2 to 6, and chroma of 3 to 6. It is silt loam, silty clay loam, silty clay, or clay.

The Bw horizon has hue of 5YR to 10YR, value of 3 to 6, and chroma of 3 to 8. It has mottles with chroma of 2 or less in the lower part. This horizon is clay loam, silty clay loam, silty clay, or clay in the fine-earth fraction.

The C horizon, if it occurs, has hue of 5YR to 10YR, value of 3 to 6, and chroma of 1 to 8. It is clay loam, silty clay loam, silty clay, or clay in the fine-earth fraction.

Rayne Series

The Rayne series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in residuum of interbedded shale, siltstone, and sandstone. Slopes range from 7 to 60 percent.

Rayne soils are associated with Berks and Weikert soils. They are deeper over bedrock than the associated soils.

Typical profile of Rayne silt loam, in an area of Rayne-Berks complex, 15 to 35 percent slopes; about 0.8 mile northwest 289 degrees of the junction of Virginia 712 and a gas pipeline and 1.0 mile northwest 304 degrees of the junction of Virginia 610 and Virginia 712:

A—0 to 6 inches; yellowish brown (10YR 5/4) silt loam;

moderate medium granular structure; friable, slightly sticky and slightly plastic; about 5 percent channers; very strongly acid; abrupt smooth boundary.

Bt1—6 to 27 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable, sticky and plastic; many faint clay films on faces of peds; about 12 percent channers; very strongly acid; gradual smooth boundary.

Bt2—27 to 40 inches; yellowish brown (10YR 5/6) channery silty clay loam; many medium and coarse faint yellow (10YR 7/6), many medium and coarse prominent red (2.5YR 5/8), and many medium and coarse distinct gray (10YR 5/1) mottles; weak medium subangular blocky structure; friable, sticky and plastic; common faint clay films on faces of peds; about 30 percent channers; very strongly acid; clear smooth boundary.

BC—40 to 47 inches; yellowish brown (10YR 5/6) channery silty clay loam; many medium and coarse faint yellow (10YR 7/6), many medium and coarse prominent red (2.5YR 5/8), and many medium and coarse distinct gray (10YR 5/1) mottles; weak medium subangular blocky structure; friable, sticky and plastic; common faint clay films on faces of peds; about 30 percent channers; very strongly acid; clear smooth boundary.

C—47 to 58 inches; mottled yellow (10YR 7/6), brown (10YR 5/3), and gray (10YR 5/1) very channery silt loam; massive; friable, slightly sticky and slightly plastic; few prominent clay flows in cracks; about 40 percent channers; very strongly acid; clear wavy boundary.

R—58 inches; shale bedrock.

The thickness of the solum and the depth to bedrock range from 40 to 60 inches. The content of gravel and channers ranges from 0 to 15 percent in the A and Ap horizons, from 0 to 35 percent in the Bt horizon, and from 15 to 90 percent in the BC and C horizons. Reaction is very strongly acid or strongly acid unless the soils are limed.

Some pedons have an A horizon, and others have an Ap horizon. These horizons have hue of 10YR, value of 3 to 5, and chroma of 2 to 4. They are loam or silt loam.

The Bt and BC horizons have hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. They are loam, silt loam, clay loam, or silty clay loam in the fine-earth fraction.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 8, and chroma of 1 to 8. It is sandy loam, loam, silt loam, clay loam, or silty clay loam in the fine-earth fraction.

Shottower Series

The Shottower series consists of very deep, well drained, moderately permeable soils on high stream terraces. These soils formed in alluvium derived from limestone, shale, siltstone, sandstone, and quartzite mixed with material derived from crystalline rocks. Slopes range from 2 to 30 percent.

Shottower soils are associated with Austinville, Chiswell, Frederick, Groseclose, and Litz soils. Unlike the associated soils, they have rounded rock fragments.

Typical profile of Shottower loam, 2 to 7 percent slopes, about 0.83 mile southeast 134 degrees of the junction of Virginia 630 and Virginia 631 and 1.25 miles southwest 227 degrees of the junction of U.S. 52 and Virginia 619:

Ap—0 to 10 inches; brown (7.5YR 4/4) loam; moderate medium granular structure; friable, slightly sticky and slightly plastic; about 10 percent rounded gravel; slightly acid; abrupt smooth boundary.

Bt1—10 to 19 inches; yellowish red (5YR 5/8) clay loam; moderate fine subangular blocky structure; friable, sticky and plastic; common faint clay films on faces of peds; about 3 percent rounded gravel; strongly acid; clear smooth boundary.

Bt2—19 to 40 inches; red (2.5YR 4/6) clay; many coarse distinct yellowish red (5YR 5/6) mottles; strong fine subangular blocky structure; friable, sticky and plastic; many distinct clay films on faces of peds; about 5 percent rounded gravel; strongly acid; diffuse smooth boundary.

Bt3—40 to 72 inches; red (2.5YR 4/6) clay; common coarse distinct yellowish brown (10YR 5/6) mottles; strong fine subangular blocky structure; firm, sticky and plastic; many distinct clay films on faces of peds; about 10 percent rounded gravel; strongly acid.

The thickness of the solum and the depth to bedrock are more than 60 inches. The content of gravel and cobbles ranges from 0 to 15 percent in the A and Ap horizons and in the upper part of the Bt horizon and from 0 to 60 percent in the lower part of the Bt horizon. Reaction ranges from extremely acid to moderately acid unless the soils are limed.

The A horizon, if it occurs, has hue of 5YR to 10YR and value and chroma of 2 or 3. It is fine sandy loam, loam, or silt loam.

The Ap horizon, if it occurs, has hue of 2.5YR to 10YR, value of 3 to 5, and chroma of 3 or 4. It is fine sandy loam, loam, or silt loam.

The Bt horizon has hue of 10R to 7.5YR, value of 4 or 5, and chroma of 4 to 8. It is sandy clay loam, clay

loam, silty clay loam, silty clay, or clay in the fine-earth fraction.

Sindion Series

The Sindion series consists of very deep, moderately well drained, moderately permeable soils on flood plains. These soils formed in alluvium derived from limestone, shale, siltstone, and sandstone. Slopes range from 0 to 3 percent.

Sindion soils are associated with Clubcaf, Speedwell, and Wheeling soils. They are better drained than Clubcaf soils and are wetter than Speedwell soils. Unlike Wheeling soils, they have a thick, dark surface layer.

Typical profile of Sindion loam, 0 to 3 percent slopes, occasionally flooded, about 1.3 miles northeast 73 degrees of the junction of U.S. 21 and Virginia 619 and 1.0 mile west 279 degrees of the junction of Virginia 619 and Virginia 707:

Ap—0 to 10 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; moderate medium granular structure; friable, slightly sticky and slightly plastic; many fine and medium roots; neutral; abrupt smooth boundary.

A—10 to 21 inches; very dark grayish brown (10YR 3/2) loam, brown (10YR 4/3) dry; moderate medium granular structure; friable, slightly sticky and slightly plastic; many fine and medium roots; neutral; clear smooth boundary.

Bw1—21 to 31 inches; mottled grayish brown (10YR 5/2), yellowish brown (10YR 5/6), and black (10YR 2/1) loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine roots; about 30 percent manganese concretions; neutral; abrupt smooth boundary.

Bw2—31 to 41 inches; strong brown (7.5YR 4/6) clay loam; many medium distinct gray (10YR 5/1) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; about 2 percent gravel and cobbles; neutral; abrupt smooth boundary.

Cg—41 to 65 inches; gray (10YR 5/1) very cobbly sandy loam; many medium faint brown (10YR 5/3) and yellowish brown (10YR 5/6) mottles; massive; friable, slightly sticky and nonplastic; few fine roots; about 40 percent gravel and cobbles; neutral.

The thickness of the solum ranges from 30 to more than 60 inches. The depth to bedrock is more than 60 inches. The content of gravel and cobbles ranges from 0 to 15 percent in the A, Ap, and Bw horizons and from 0 to 80 percent in the Cg and C horizons. Some pedons have few or common flakes of mica. Reaction ranges from slightly acid to moderately alkaline.

The Ap horizon, if it occurs, has hue of 7.5YR or 10YR and value and chroma of 2 or 3. It is sandy loam, fine sandy loam, loam, silt loam, clay loam, or silty clay loam.

The A horizon, if it occurs, has hue of 7.5YR or 10YR and value and chroma of 2 or 3. It is sandy loam, fine sandy loam, loam, or silt loam.

The upper part of the Bw horizon has hue of 7.5YR to 5Y, value of 2 to 7, and chroma of 1 to 4. The lower part has hue of 7.5YR to 5Y or is neutral in hue. It has value of 4 to 7 and chroma of 0 to 6. This horizon is loam, silt loam, clay loam, or silty clay loam.

The Cg horizon, if it occurs, has hue of 7.5YR to 5Y or is neutral in hue. It has value of 2 to 7 and chroma of 0 to 4. It is sandy loam, loam, silt loam, clay loam, or silty clay loam in the fine-earth fraction and commonly is stratified.

The C horizon, if it occurs, has hue of 7.5YR to 5Y, value of 2 to 7, and chroma of 1 to 4. It is sandy loam, loam, silt loam, clay loam, or silty clay loam in the fine-earth fraction and commonly is stratified.

Speedwell Series

The Speedwell series consists of very deep, well drained, moderately permeable soils on flood plains. These soils formed in alluvium derived from limestone, shale, siltstone, and sandstone. Slopes range from 0 to 3 percent.

Speedwell soils are associated with Clubcaf, Sindion, and Wheeling soils. They are better drained than Clubcaf and Sindion soils and have a surface layer that is thicker and darker than that of Wheeling soils.

Typical profile of Speedwell sandy loam, 0 to 3 percent slopes, occasionally flooded, about 1.3 miles northeast 60 degrees of the junction of U.S. 21 and Virginia 619 and 1.7 miles south 170 degrees of the junction of Virginia 651 and Virginia 684:

Ap—0 to 18 inches; dark brown (10YR 3/3) sandy loam, dark yellowish brown (10YR 4/4) dry; moderate fine granular structure; friable, slightly sticky and slightly plastic; many fine and medium roots; neutral; abrupt smooth boundary.

Bw—18 to 42 inches; dark yellowish brown (10YR 3/4) sandy clay loam, dark yellowish brown (10YR 4/6) dry; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; common fine roots; neutral; clear smooth boundary.

C—42 to 72 inches; dark yellowish brown (10YR 3/6) gravelly coarse sandy loam; massive; friable, slightly sticky and slightly plastic; few fine roots;

about 30 percent gravel; neutral.

The thickness of the solum ranges from 30 to more than 60 inches. The depth to bedrock is more than 60 inches. The content of gravel and cobbles ranges from 0 to 15 percent in the A, Ap, and Bw horizons and from 0 to 80 percent in the C horizon. Some pedons have few or common flakes of mica. Reaction ranges from slightly acid to moderately alkaline.

Some pedons have an A horizon, and others have an Ap horizon. These horizons have hue of 7.5YR or 10YR and value and chroma of 2 or 3. They are sandy loam, fine sandy loam, loam, or silt loam.

The Bw horizon has hue of 7.5YR or 10YR. It generally has value of 4 or 5 and chroma of 4 to 6, but in some pedons it has value of 2 or 3 and chroma of 2 to 4 in the upper part. This horizon is loam, silt loam, sandy clay loam, clay loam, or silty clay loam.

The C horizon, if it occurs, has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. It is coarse sandy loam, sandy loam, loam, silt loam, sandy clay loam, or clay loam in the fine-earth fraction.

Sylco Series

The Sylco series consists of moderately deep, well drained, moderately permeable soils on uplands. These soils formed in residuum of interbedded phyllite, slate, shale, siltstone, and fine grained sandstone. Slopes range from 7 to 65 percent.

Sylco soils are associated with Sylvatus soils. They are deeper over bedrock than Sylvatus soils.

Typical profile of Sylco channery silt loam, in an area of Sylvatus-Sylco complex, 35 to 65 percent slopes; about 2.5 miles northwest 295 degrees of the junction of Virginia 645 and Virginia 640 and 1.1 miles south 182 degrees of the junction of Virginia 640 and Virginia 720:

Oi—2 inches to 0; partially decomposed and undecomposed leaves and twigs.

A—0 to 3 inches; dark grayish brown (10YR 4/2) channery silt loam; weak fine granular structure; friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; about 30 percent channers; very strongly acid; clear smooth boundary.

E—3 to 7 inches; brown (10YR 4/3) channery silt loam; weak fine granular structure; friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; about 30 percent channers; very strongly acid; clear smooth boundary.

Bw1—7 to 13 inches; yellowish brown (10YR 5/4) very channery silt loam; weak medium granular structure; friable, slightly sticky and slightly plastic; common fine and medium roots; few faint silt coatings on faces of peds and channers; about 35 percent channers; very strongly acid; gradual wavy boundary.

Bw2—13 to 25 inches; yellowish brown (10YR 5/4) very channery silt loam; weak medium granular structure; friable, slightly sticky and slightly plastic; few fine roots; few faint silt coatings on faces of peds and channers; about 35 percent channers; very strongly acid; clear smooth boundary.

C—25 to 35 inches; yellowish brown (10YR 5/6) extremely channery silt loam; massive; friable, slightly sticky and slightly plastic; few fine roots; few faint silt coatings on channers; about 70 percent channers; very strongly acid; clear wavy boundary.

R—35 inches; phyllite bedrock.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. The content of channers ranges from 10 to 35 percent in the A and E horizons, from 15 to 35 percent in the Bw horizon, and from 40 to 70 percent in the C horizon. Reaction is very strongly acid or strongly acid unless the soils are limed.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2. The E horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. The Bw and C horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6.

Sylvatus Series

The Sylvatus series consists of shallow, well drained, moderately permeable soils on uplands. These soils formed in residuum of interbedded phyllite, slate, shale, siltstone, and fine grained sandstone. Slopes range from 7 to 65 percent.

Sylvatus soils are associated with Sylco soils. They are shallower over bedrock than Sylco soils.

Typical profile of Sylvatus channery silt loam, in an area of Sylvatus-Sylco complex, 35 to 65 percent slopes; about 3.4 miles southeast 149 degrees of the junction of U.S. 21 and Virginia 619 and 3.2 miles south 190 degrees of the junction of Virginia 619 and Virginia 707:

Oi—2 inches to 0; partially decomposed and undecomposed leaves and twigs.

A—0 to 3 inches; brown (10YR 4/3) channery silt loam; weak fine granular structure; friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; about 30 percent channers; very strongly acid; clear smooth boundary.

Bw1—3 to 7 inches; strong brown (7.5YR 5/6) channery

silt loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; common faint silt coatings on faces of peds and channers; about 25 percent channers; very strongly acid; clear smooth boundary.

Bw2—7 to 15 inches; strong brown (7.5YR 5/6) extremely channery silt loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; common faint silt coatings on faces of peds and channers; about 70 percent channers; very strongly acid; clear smooth boundary.

C—15 to 18 inches; mottled reddish yellow (7.5YR 6/6) and very dark gray (10YR 3/1) extremely channery silt loam; massive; friable, slightly sticky and slightly plastic; few fine roots; about 90 percent channers; very strongly acid; clear wavy boundary.

R—18 inches; phyllite bedrock.

The thickness of the solum ranges from 10 to 18 inches. The depth to bedrock ranges from 10 to 20 inches. The content of channers ranges from 15 to 75 percent in the A horizon, from 20 to 80 percent in the Bw horizon, and from 45 to 90 percent in the C horizon. Reaction is extremely acid or very strongly acid unless the soils are limed.

The A horizon has hue of 10YR, value of 2 to 5, and chroma of 1 to 4. It is loam or silt loam in the fine-earth fraction.

The Bw horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. It is loam, silt loam, clay loam, or silty clay loam in the fine-earth fraction.

The C horizon has hue of 5YR to 10YR, value of 3 to 6, and chroma of 1 to 8. It is loam, silt loam, clay loam, or silty clay loam in the fine-earth fraction.

Timberville Series

The Timberville series consists of very deep, well drained, moderately permeable soils on uplands. These soils formed in colluvium and alluvium derived from limestone, shale, siltstone, and sandstone. Slopes range from 0 to 15 percent.

Timberville soils are associated with Chiswell, Frederick, Groseclose, Hagerstown, Litz, Marbie, Wurno, and Wyrick soils. Unlike the associated soils, they have buried horizons.

Typical profile of Timberville silt loam, 0 to 7 percent slopes, occasionally flooded, about 0.5 mile southeast 124 degrees of the intersection of Virginia 674 and Virginia 709 and 1.4 miles north 354 degrees of the intersection of Virginia 709 and Virginia 699:

Ap—0 to 5 inches; brown (7.5YR 4/4) silt loam; moderate fine and medium granular structure; friable, slightly sticky and slightly plastic; many fine and few medium roots; about 2 percent gravel; neutral; clear smooth boundary.

Bw—5 to 17 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; many fine roots; few faint silt coatings on faces of peds; common fine manganese concretions; about 2 percent gravel; moderately acid; clear smooth boundary.

Ab—17 to 28 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure parting to weak fine granular; friable, slightly sticky and slightly plastic; common fine roots; common fine manganese concretions; about 2 percent gravel; strongly acid; clear smooth boundary.

2Btb1—28 to 47 inches; yellowish brown (10YR 5/6) silty clay loam; moderate fine and medium subangular blocky structure; friable, sticky and plastic; few fine roots; many distinct clay films on faces of peds; many fine manganese concretions; about 2 percent gravel; moderately acid; clear smooth boundary.

2Btb2—47 to 58 inches; yellowish brown (10YR 5/6) silty clay loam; many medium faint yellow (10YR 7/6), many medium prominent dusky red (10R 3/4), and many medium distinct white (10YR 8/1) mottles; moderate fine and medium subangular blocky structure; friable, sticky and plastic; few fine roots; common distinct clay films on faces of peds; common fine manganese concretions; about 3 percent gravel; moderately acid; clear smooth boundary.

2Btb3—58 to 72 inches; yellowish brown (10YR 5/8) silt loam; many medium distinct yellow (10YR 7/6) and dusky red (10R 3/4) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; common distinct clay films on faces of peds; common fine manganese concretions; about 3 percent gravel; moderately acid.

The thickness of the solum and the depth to bedrock are more than 60 inches. The content of gravel and cobbles ranges from 0 to 15 percent in the A and Ap horizons and from 0 to 60 percent in the Bw, Ab, Bwb, and 2Btb horizons. Reaction ranges from extremely acid to moderately acid unless the soils are limed.

The A horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 5. It is fine sandy loam, loam, or silt loam.

The Ap horizon, if it occurs, has hue of 7.5YR or

10YR, value of 4 to 6, and chroma of 3 to 5. It is fine sandy loam, loam, or silt loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is silt loam, clay loam, or silty clay loam in the fine-earth fraction.

The Ab horizon, if it occurs, has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 2 to 4. It is loam, silt loam, or silty clay loam in the fine-earth fraction.

The Bwb horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. It is loam, silt loam, sandy clay loam, clay loam, or silty clay loam in the fine-earth fraction.

The 2Btb horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. It is clay loam, silty clay loam, silty clay, or clay in the fine-earth fraction.

Weikert Series

The Weikert series consists of shallow, well drained, moderately rapidly permeable soils on uplands. These soils formed in residuum of shale interbedded with siltstone and sandstone (fig. 14). Slopes range from 7 to 65 percent.

Weikert soils are associated with Berks and Rayne soils. They are shallower over bedrock than the associated soils.

Typical profile of Weikert channery silt loam, in an area of Weikert-Berks complex, 15 to 35 percent slopes; about 2.1 miles west 274 degrees of the junction of Virginia 717 and U.S. 21 and 1.9 miles west 263 degrees of the junction of Virginia 686 and U.S. 21:

Oi—2 inches to 0; partially decomposed and undecomposed leaves and twigs.

A—0 to 6 inches; brown (10YR 5/3) channery silt loam; weak fine granular structure; friable, slightly sticky and slightly plastic; common fine and medium roots; about 20 percent channers; very strongly acid; clear smooth boundary.

Bw—6 to 12 inches; brownish yellow (10YR 6/6) very channery silt loam; weak fine granular structure; friable, slightly sticky and slightly plastic; few fine and medium roots; common faint silt coatings on faces of peds and channers; about 45 percent channers; extremely acid; clear smooth boundary.

R—12 inches; shale bedrock.

The thickness of the solum ranges from 8 to 20 inches. The depth to bedrock ranges from 10 to 20 inches. The content of channers ranges from 20 to 50 percent in the A and Ap horizons, from 35 to 60 percent in the Bw horizon, and from 60 to 85 percent in the C horizon. Reaction ranges from very strongly acid to moderately acid in the A and Ap horizons and from extremely acid to moderately acid in the Bw and C horizons unless the soils are limed.

Some pedons have an A horizon, and others have an Ap horizon. These horizons have hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. They are silt loam in the fine-earth fraction.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. It is loam or silt loam in the fine-earth fraction.

The C horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is loam or silt loam in the fine-earth fraction.

Wheeling Series

The Wheeling series consists of very deep, well drained, moderately permeable soils on stream terraces. These soils formed in alluvium derived from limestone, sandstone, siltstone, and shale. Slopes range from 2 to 7 percent.

Wheeling soils are associated with Clubcaf, Sindion, and Speedwell soils. They are better drained than Clubcaf soils and have a surface layer that is lighter colored than that of Sindion and Speedwell soils.

Typical profile of Wheeling loam, 2 to 7 percent slopes, about 1.4 miles northeast 44 degrees of the junction of Virginia 619 and Virginia 636 and 1.7 miles northeast 63 degrees of the junction of Virginia 619 and Virginia 631:

Ap—0 to 9 inches; dark yellowish brown (10YR 4/4) loam; moderate fine and medium granular structure; friable, slightly sticky and slightly plastic; many fine and medium roots; common fine flakes of mica; slightly acid; abrupt smooth boundary.

Bt1—9 to 31 inches; strong brown (7.5YR 4/6) silty clay loam; moderate medium subangular blocky structure; friable, sticky and plastic; common fine and medium roots; common distinct clay films on faces of peds; common fine flakes of mica; few black manganese stains; moderately acid; gradual smooth boundary.

Bt2—31 to 47 inches; strong brown (7.5YR 5/6) very fine sandy loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine roots; common distinct clay films on faces of peds; common fine flakes of mica; few black manganese stains; moderately acid; clear smooth boundary.

Bt3—47 to 65 inches; strong brown (7.5YR 5/6) very fine sandy loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; few distinct clay films on faces of peds; common fine flakes of mica; few black manganese stains; moderately acid.

Figure 14.—Profile of Weikert soils, which are shallow over shale, siltstone, and sandstone.

The thickness of the solum ranges from 40 to more than 60 inches. The depth to bedrock is more than 60 inches. The content of gravel and cobbles ranges from 0 to 15 percent in the Ap horizon and in the upper part of the Bt horizon and from 0 to 80 percent in the lower part of the Bt horizon and in the BC and C horizons. Reaction is strongly acid or moderately acid unless the soils are limed.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. It is fine sandy loam, loam, or silt loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4

or 5, and chroma of 3 to 6. It is loam, silt loam, or silty clay loam.

The BC horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is sandy loam or very fine sandy loam.

The C horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is stratified and ranges from loam to gravel.

Wurno Series

The Wurno series consists of moderately deep, well drained, moderately permeable soils on uplands. These soils formed in residuum of interbedded calcareous shale and limestone. Slopes range from 2 to 70 percent.

Wurno soils are associated with Hagerstown, Marbie, Timberville, and Wyrick soils. They are shallower over bedrock than the associated soils.

Typical profile of Wurno channery silt loam, in an area of Hagerstown-Wurno complex, 7 to 15 percent slopes; about 0.5 mile southeast 166 degrees of where Interstate 77 extends south from its junction with Interstate 81 and 1.7 miles east 101 degrees of the junction of Interstate 81 and U.S. 52:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) channery silt loam; weak fine granular structure; friable, slightly sticky and slightly plastic; many fine and medium roots; about 20 percent channers; slightly acid; clear wavy boundary.

Bw1—6 to 11 inches; brown (10YR 5/3) channery silt loam; common medium distinct dark brown (10YR 3/3) mottles; weak fine and very fine subangular blocky structure; friable, slightly sticky and slightly plastic; many fine and medium roots; about 25 percent channers; neutral; clear wavy boundary.

Bw2—11 to 16 inches; light yellowish brown (10YR 6/4) extremely channery silt loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; many fine roots; common distinct silt and clay flows on channers; about 65 percent channers; slightly acid; gradual smooth boundary.

C—16 to 25 inches; strong brown (7.5YR 5/6) extremely channery loam; massive; friable, slightly sticky and slightly plastic; few fine roots; about 80 percent channers; neutral; clear irregular boundary.

Cr—25 to 32 inches; strong brown (7.5YR 5/6), weathered shale bedrock.

R—32 inches; interbedded calcareous shale and limestone bedrock.

The thickness of the solum ranges from 10 to 30 inches. The depth to bedrock ranges from 20 to 40 inches. The content of channers ranges from 15 to 80 percent in the A, Ap, Bw, and C horizons. Reaction ranges from very strongly acid to mildly alkaline in the A, Ap, and Bw horizons and is neutral or mildly alkaline in the C horizon.

The A horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 3 or 4, and chroma of 2 or 3. It is loam or silt loam in the fine-earth fraction.

The Ap horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 to 4. It is loam or silt loam in the fine-earth fraction.

The Bw horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is silt loam or silty clay loam in the fine-earth fraction.

The C and Cr horizons have hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. The C horizon is loam or silt loam in the fine-earth fraction.

Wyrick Series

The Wyrick series consists of very deep, well drained, moderately permeable soils on uplands. These soils formed in colluvium and alluvium derived from limestone, shale, siltstone, and fine grained sandstone and in the underlying residuum of limestone and shale. Slopes range from 2 to 25 percent.

Wyrick soils are associated with Frederick, Hagerstown, Marbie, Timberville, and Wurno soils. They contain less clay than Frederick and Hagerstown soils, do not have the fragipan characteristic of Marbie soils, do not have the buried horizons characteristic of Timberville soils, and are deeper over bedrock than Wurno soils.

Typical profile of Wyrick silt loam, in an area of Marbie-Wyrick complex, 7 to 15 percent slopes; about 1.3 miles northeast 72 degrees of the junction of U.S. 11 and Virginia 680 and 300 feet north of U.S. 11:

Ap—0 to 13 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine and medium granular structure; friable, slightly sticky and slightly plastic; few fine and medium roots; few manganese concretions; about 8 percent gravel; very strongly acid; abrupt smooth boundary.

Bt1—13 to 22 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine roots; common distinct clay films on faces of peds; about 2 percent gravel; very strongly acid; clear wavy boundary.

Bt2—22 to 36 inches; yellowish brown (10YR 5/8) silty clay loam; common fine faint light yellowish brown (10YR 6/4) mottles; moderate fine and medium subangular blocky structure; firm, sticky and slightly

plastic; few fine roots; many distinct clay films on faces of peds; few manganese concretions; about 12 percent gravel; very strongly acid; diffuse wavy boundary.

Bt3—36 to 46 inches; yellowish brown (10YR 5/8) silty clay loam; common medium faint brownish yellow (10YR 6/6) mottles; moderate fine and medium subangular blocky structure; firm, sticky and plastic; few very fine and fine roots; many distinct clay films on faces of peds; few manganese concretions; about 2 percent gravel; very strongly acid; diffuse wavy boundary.

2Bt4—46 to 53 inches; yellowish brown (10YR 5/8) silty clay; moderate medium subangular blocky structure; firm, sticky and plastic; many distinct clay films on faces of peds; few manganese stains and concretions; about 5 percent gravel; very strongly acid; diffuse irregular boundary.

2Bt5—53 to 63 inches; yellowish brown (10YR 5/8) clay; moderate medium subangular blocky structure; firm, sticky and plastic; many distinct clay films on faces of peds; few manganese stains and concretions; about 5 percent gravel; very strongly acid.

The thickness of the solum ranges from 40 to more than 60 inches. The depth to lithologic discontinuity ranges from 20 to 60 inches. The depth to bedrock is more than 60 inches. The content of gravel ranges from 0 to 15 percent in the A, Ap, Bt, 2Bt, and 2C horizons. Reaction ranges from extremely acid to strongly acid unless the soils are limed.

The A horizon, if it occurs, has hue of 7.5YR or 10YR and value and chroma of 2 or 3. It is loam, silt loam, or silty clay loam.

The Ap horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. It is loam, silt loam, or silty clay loam.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is loam, silt loam, clay loam, or silty clay loam.

The 2Bt horizon has hue of 5YR to 10YR and value and chroma of 4 to 8. It is silty clay loam, silty clay, or clay.

The 2C horizon, if it occurs, has hue of 5YR to 2.5Y and value and chroma of 4 to 8. It is loam, silt loam, clay loam, silty clay loam, silty clay, or clay.

Formation of the Soils

This section relates the factors of soil formation to the soils in Wythe County and describes soil morphology and the processes of soil formation.

Factors of Soil Formation

The five major factors of soil formation are parent material, relief, climate, plant and animal life, and time. Climate and plant and animal life are the active forces of soil formation. Their effects on the parent material are modified by relief and the length of time that the parent material has been subject to weathering. In some areas one factor dominates soil formation and determines most of the soil properties. Normally, however, the interaction of all five factors determines the kind of soil that forms.

Parent Material

Parent material is the material in which a soil forms. It can be divided into two broad classes—residual material and transported material.

Residual material has weathered in place from the underlying bedrock. It is highly weathered saprolite that remains after the bedrock weathers. The characteristics of the residual material and, consequently, of the soil are directly related to the characteristics of the underlying bedrock.

Transported material in Wythe County is either alluvium or colluvium. Alluvium was eroded from uplands and moved by floodwater, and colluvium was moved by creep, slide, or local wash. Alluvium was deposited as soil particles and rock fragments on the terraces and flood plains along streams. Colluvium collected on the side slopes and foot slopes of uplands or on benches or fans. The characteristics of transported material are related to the characteristics of the soils or rocks in the areas from which the material was removed. Alluvium and colluvium are in scattered areas throughout the county. They cover about one-third of the county.

Shottower, Botetourt, Wheeling, and Ingledove soils formed in alluvial sediments deposited by streams over residual material on uplands. Subsequent erosion has removed some of the sediments. Jefferson, Matneflat, Timberville, Marbie, and Wyrick soils formed in local alluvial and colluvial sediments deposited on alluvial fans and along upland drainageways. Clubcaf, Derroc, Evansham, Gullion, Nomberville, Pagebrook, Sindion, and Speedwell soils formed in sediments moved and deposited by floodwater on the flood plains along streams.

On about two-thirds of the acreage in the county, the soils formed in residual material weathered in place from sedimentary rocks, including shale, siltstone, sandstone, limestone, dolomite, phyllite, and slate. These rocks developed from sediments deposited in a shallow sea primarily during the Cambrian, Ordovician, Silurian, Devonian, and Mississippian Periods.

Residual material derived from shale, siltstone, and fine grained sandstone covers about 30 percent of the county. It is mostly in the eastern part of the Great Valley and in the Allegheny Mountains. Residual material derived from dolomite and limestone covers about 25 percent of the county, mostly in the western part of the Great Valley. Residual material derived from sandstone covers about 10 percent of the county, mostly on Lick Mountain. Residual material derived from phyllite and slate covers a small acreage, mostly in the Blue Ridge province. Residual material derived from phyllite and slate covers a large acreage in the part of county in the Jefferson National Forest.

Chiswell, Litz, Berks, and Weikert soils formed in material weathered from shale, siltstone, and fine grained sandstone. Frederick, Hagerstown, Groseclose, and Austinville soils formed in material weathered from limestone and dolomite. Dekalb, Drypond, and Lily soils formed in material weathered from sandstone. Sylco and Sylvatus soils formed in material weathered from phyllite and slate.

Relief

Relief affects the formation of soils through its effect on the quantity of water that penetrates the surface, the rate of surface runoff, internal soil drainage, soil temperature, and geologic erosion. It can alter the effects of the climatic factors acting on the parent

material to the extent that several different kinds of soil form in the same kind of parent material. Relief also affects the amount of radiant energy absorbed by the soils. The radiant energy, in turn, affects the type of native vegetation that grows on the soils.

Relief in Wythe County ranges from nearly level to very steep. The nearly level soils are commonly on flood plains along streams and on low stream terraces. These soils formed in recent alluvial material. They have a buried A horizon, a relatively high content of organic matter in the lower layers, or both. These calcium-rich soils have a dark surface layer because of a high content of organic matter. They generally support grasses but have been forested in the past. Clubcaf, Evansham, Nomberville, Sindion, and Speedwell soils are examples.

The gently sloping to very steep soils in the Great Valley are commonly well drained and have a slowly permeable to moderately permeable subsoil. Surface runoff is medium to very rapid. Austinville, Chiswell, Frederick, Groseclose, Hagerstown, Litz, and Shottower soils are examples. Austinville, Frederick, Groseclose, Hagerstown, and Shottower soils are on the gentler slopes and have well defined horizons. Chiswell and Litz soils are on the steeper slopes and do not have distinct horizons.

In many areas of the sloping to very steep soils in the Allegheny Mountains, on Lick Mountain, and in the Blue Ridge province, surface runoff is very rapid, the rate of water infiltration and the movement of clay and bases through the profile are restricted, and erosion is a severe hazard. Because of high relief in these areas, the soils commonly are shallower over bedrock than other soils in the county and have weakly expressed horizons. Berks, Dekalb, Drypond, Sylco, Sylvatus, and Weikert soils are examples.

Climate

Precipitation and temperature are the main climatic factors of soil formation. Water dissolves minerals, supports biological activity, and transports ions, compounds, minerals, and organic residue through the soil. As it percolates through the soil, for example, it translocates clay to the subsoil. Temperature determines the types of physical, chemical, and biological activities that take place in the soil and the speed of these activities.

Because the amount of precipitation exceeds evapotranspiration, some water moves downward into the moist substratum of some soils, such as Austinville, Frederick, Groseclose, and Shottower soils. The rate at which bases are released by weathering generally is equal to or slower than the rate of their removal by leaching. Most of the bases are held in the upper few inches of the soil and in the vegetation that grows on the soil. Base saturation decreases with increasing depth because the vegetation has cycled the bases in most of the soils. Exceptions are Clubcaf, Evansham, Gullion, Nomberville, Sindion, Speedwell, and other alluvial soils, which receive bases dissolved from limestone and dolomite bedrock and leached from soils in the adjacent uplands.

Weathering, translocation, and leaching of soil material occur throughout most of each year. Climatic factors activate these forces, which determine, to a large degree, the characteristics of most of the soils in the county.

The climate is uniform throughout the county. Its effect on soil formation may be modified locally by the gradient and aspect of slopes. Local variations in climate may cause some variation among soils, but they have not caused major differences among the soils in the county.

Plant and Animal Life

Living organisms, such as plants, animals, bacteria, and fungi, are important to soil formation. Plants generally influence the content of organic matter and plant nutrients, the color of the surface layer, and soil structure. In most areas of Wythe County, native trees have had more influence on soil formation than any other living organism. Animals, especially burrowing animals, help to keep the soil open and porous. Bacteria and fungi decompose plant remains and thus release plant nutrients.

In a few areas human activities have altered the soils. These activities include constructing highways and buildings; quarrying sandstone, limestone, shale, and phyllite; mining lead, zinc, and iron; and covering areas of earthy material with tailings and with mine spoil. Also, clearing the forests, plowing the soils, and adding fertilizer, lime, pesticides, and herbicides have changed the physical and chemical properties of the soils.

Time

The degree of horizon differentiation within the soil is related to the amount of time that the soil has been subject to the other soil-forming factors. A soil that is characterized by little or no horizon development is considered young, whereas one that has strongly developed horizons is considered old.

The oldest soils in Wythe County are mainly those that formed in material weathered from limestone and shale and in alluvial material on high stream terraces. Austinville, Frederick, and Shottower soils are

examples. These soils generally formed on relatively stable landscapes where slopes are gentle. They show a strong degree of horizon differentiation.

Soils that formed in recent alluvium, such as Clubcaf, Nomberville, and Timberville soils, have been in place only a relatively short time and show little or no evidence of profile development other than an accumulation of organic matter in the surface layer and obliteration of fine strata. Soils on terraces, such as Botetourt, Ingledove, and Wheeling soils, are generally intermediate in degree of horizon development and in the amount of bases between the old residual soils and the very young alluvial soils.

In areas of very steep soils, geologic erosion has removed soil material in a relatively short period and the soil material generally has not been in place long enough for the development of distinct horizons. Berks, Sylco, Sylvatus, and Weikert soils are examples.

Basic Soil Morphology

A soil profile and its layers, or horizons, are the result of the interaction of the soil-forming factors. The soil profile generally extends downward from the surface to material that is little altered by the soil-forming processes.

Many soils have four major horizons, called A, E, B, and C horizons. The horizons are normally in that order from the surface downward. Numbers and letters indicate subdivisions of the major horizons. An example is the Bt horizon, which is a B horizon that has an accumulation of clay.

The A horizon is the surface layer. It has more organic matter than the other soil horizons.

The E horizon is a layer characterized by the maximum leaching and eluviation of clay and iron. It underlies the A horizon.

The B horizon underlies the A or E horizon. It is commonly called the subsoil. It is characterized by the maximum accumulation, or illuviation, of clay, iron, aluminum, or other compounds leached from the surface layer. In some soils the B horizon formed through alteration in place rather than through illuviation. The alteration can be caused by the oxidation and reduction of iron or by the weathering of clay minerals. The B horizon commonly has blocky or prismatic structure. It generally is firmer and lighter in color than the A horizon but darker than the E and C horizons.

The C horizon generally underlies the B horizon, but in some soils it is directly below the A horizon. It consists of material that is little altered by the soil-forming processes.

Processes of Soil Formation

Several processes are involved in the formation of soil horizons. Among these are the accumulation of organic matter, the leaching of soluble salts, the reduction and transfer of iron, the formation of soil structure, and the formation and downward movement of clay minerals. These are continuous and generally simultaneous processes that have been going on for thousands of years.

Organic matter accumulates as plant and animal material decomposes. It darkens the surface layer and helps to form the A horizon. Once lost, it normally takes a long time to replace. In the surface layer of the soils in Wythe County, the content of organic matter averages about 2 percent.

Soils that have a distinct subsoil were leached of some bases and other soluble salts before clay minerals began to move downward. Among the factors that affect this leaching are the kinds of salts in the original parent material, the depth to which water penetrates, and the texture, structure, and bulk density of the horizons in the profile.

The well drained and moderately well drained soils in Wythe County have a dark red to yellowish brown subsoil. These colors result mainly from thin coatings of iron oxide on the soil particles. In some soils, such as Chiswell soils, the colors are inherited from the bedrock.

Gleying, or the reduction and transfer of iron, occurs mainly in the more poorly drained soils. Moderately well drained and somewhat poorly drained soils have gray, yellowish brown, strong brown, or red mottles, which indicate the segregation of iron. In poorly drained soils, such as Clubcaf and Evansham soils, grayish colors in the subsoil and substratum indicate the reduction and transfer of iron in solution.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 40-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on the contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the

trampling of cattle or the slippage of saturated soil.

Cement rock. Shaly limestone used in the manufacture of cement.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage and planting system in which crop residue covers at least 30 percent of the soil surface after planting. Where soil erosion by wind is the main concern, the system leaves the equivalent of at least 1,000 pounds per acre of flat small-grain residue on the surface during the critical erosion period.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when

light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai. Commonly a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of Vertisols—clayey soils having a high coefficient of expansion and contraction with changes in moisture content.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or

blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*,

more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the substratum. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones

adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the substratum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1955-85 at Wytheville, Virginia)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January	41.9	21.2	31.6	65	-9	36	2.55	3.45	1.43	6	9.3
February	47.4	23.9	35.7	70	-1	55	2.99	3.83	1.46	6	5.8
March	56.0	30.2	43.1	78	9	172	3.41	4.26	2.29	8	6.5
April	66.7	38.5	52.6	83	19	381	3.26	4.61	1.80	7	.4
May	74.6	47.2	60.9	86	26	648	3.70	4.57	2.87	8	.0
June	80.3	54.1	67.2	90	36	815	3.12	4.26	1.75	6	.0
July	83.5	58.7	71.1	91	43	965	4.42	5.51	2.74	8	.0
August	83.1	57.6	70.4	91	40	941	3.31	5.28	1.70	7	.0
September	77.9	51.4	64.7	90	30	735	2.90	4.22	1.45	5	.0
October	68.0	40.1	54.1	83	18	439	3.25	4.00	2.11	6	.0
November	56.7	31.7	44.2	77	10	184	2.65	3.79	1.55	6	.6
December	46.7	25.1	35.9	69	0	65	2.43	3.76	1.39	6	4.4
Yearly:											
Average	65.5	40.3	52.9	---	---	---	---	---	---	---	---
Extreme	---	---	---	90	-20	---	---	---	---	---	---
Total	---	---	---	---	---	5,436	37.99	51.54	22.54	79	27.0

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1955-85 at Wytheville, Virginia)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 29	May 11	May 22
2 years in 10 later than--	Apr. 24	May 10	May 17
5 years in 10 later than--	Apr. 11	Apr. 30	May 7
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 9	Sept. 30	Sept. 14
2 years in 10 earlier than--	Oct. 16	Oct. 4	Sept. 21
5 years in 10 earlier than--	Oct. 23	Oct. 14	Oct. 1

TABLE 3.--GROWING SEASON

(Recorded in the period 1955-85 at Wytheville, Virginia)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	175	148	122
8 years in 10	180	150	132
5 years in 10	200	169	145
2 years in 10	218	189	164
1 year in 10	222	204	177

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1B	Austinville silty clay loam, 2 to 7 percent slopes	581	0.2
1C	Austinville silty clay loam, 7 to 15 percent slopes	2,870	1.2
1D	Austinville silty clay loam, 15 to 30 percent slopes	2,647	1.1
2E	Austinville-Rock outcrop complex, 10 to 45 percent slopes	3,594	1.5
3B	Botetourt silt loam, 2 to 7 percent slopes	905	0.4
4C	Chiswell-Groseclose-Litz complex, 7 to 15 percent slopes	9,258	3.8
4D	Chiswell-Groseclose-Litz complex, 15 to 30 percent slopes	12,601	5.2
4E	Chiswell-Groseclose-Litz complex, 30 to 60 percent slopes	22,681	9.4
5A	Clubcaf silt loam, 0 to 3 percent slopes, frequently flooded	2,029	0.8
6C	Dekalb channery sandy loam, 7 to 15 percent slopes	284	0.1
6D	Dekalb channery sandy loam, 15 to 35 percent slopes	1,030	0.4
6E	Dekalb channery sandy loam, 35 to 65 percent slopes	4,072	1.7
7B	Derroc cobbly sandy loam, 0 to 5 percent slopes, occasionally flooded	1,060	0.4
8E	Drypond-Rock outcrop complex, 10 to 65 percent slopes	3,615	1.5
9A	Evansham silty clay loam, 0 to 2 percent slopes, frequently flooded	636	0.3
10B	Frederick silt loam, 2 to 7 percent slopes	4,751	2.0
10C	Frederick silt loam, 7 to 15 percent slopes	18,695	7.8
10D	Frederick silt loam, 15 to 30 percent slopes	14,680	6.1
11A	Gullion loam, 0 to 3 percent slopes, occasionally flooded	2,503	1.0
12C	Hagerstown silt loam, 7 to 15 percent slopes, very rocky	1,347	0.6
12D	Hagerstown silt loam, 15 to 30 percent slopes, very rocky	2,122	0.9
13E	Hagerstown-Rock outcrop complex, 10 to 45 percent slopes	7,181	3.0
14B	Hagerstown-Wurno complex, 2 to 7 percent slopes	247	0.1
14C	Hagerstown-Wurno complex, 7 to 15 percent slopes	3,955	1.6
14D	Hagerstown-Wurno complex, 15 to 30 percent slopes	4,565	1.9
14E	Hagerstown-Wurno complex, 30 to 45 percent slopes	2,973	1.2
15B	Ingledove loam, 2 to 7 percent slopes	1,465	0.6
16C	Jefferson cobbly loam, 7 to 15 percent slopes	3,343	1.4
16D	Jefferson cobbly loam, 15 to 35 percent slopes	4,536	1.9
16E	Jefferson cobbly loam, 35 to 60 percent slopes	1,341	0.6
17C	Lily sandy loam, 7 to 15 percent slopes	969	0.4
17D	Lily sandy loam, 15 to 35 percent slopes	1,879	0.8
17E	Lily sandy loam, 35 to 65 percent slopes	4,728	2.0
18B	Marbie-Wyrick complex, 2 to 7 percent slopes	1,145	0.5
18C	Marbie-Wyrick complex, 7 to 15 percent slopes	13,968	5.8
18D	Marbie-Wyrick complex, 15 to 25 percent slopes	1,129	0.5
19C	Matneflat gravelly sandy loam, 7 to 15 percent slopes, stony	3,767	1.6
19D	Matneflat gravelly sandy loam, 15 to 35 percent slopes, stony	8,997	3.7
19E	Matneflat gravelly sandy loam, 35 to 65 percent slopes, stony	6,177	2.6
20A	Nomberville silt loam, 0 to 3 percent slopes, occasionally flooded	850	0.4
21A	Pagebrook silt loam, 0 to 3 percent slopes, rarely flooded	279	0.1
22	Pits, quarries	675	0.3
23C	Rayne-Berks complex, 7 to 15 percent slopes	1,714	0.7
23D	Rayne-Berks complex, 15 to 35 percent slopes	1,903	0.8
23E	Rayne-Berks complex, 35 to 60 percent slopes	2,792	1.2
24F	Rock outcrop-Wurno complex, 35 to 75 percent slopes	1,604	0.7
25B	Shottower loam, 2 to 7 percent slopes	1,985	0.8
25C	Shottower loam, 7 to 15 percent slopes	5,387	2.2
25D	Shottower loam, 15 to 30 percent slopes	5,653	2.3
26A	Sindion loam, 0 to 3 percent slopes, occasionally flooded	651	0.3
27A	Speedwell sandy loam, 0 to 3 percent slopes, occasionally flooded	1,947	0.8
28C	Sylvatus-Sylco complex, 7 to 15 percent slopes	266	0.1
28D	Sylvatus-Sylco complex, 15 to 35 percent slopes	679	0.3
28E	Sylvatus-Sylco complex, 35 to 65 percent slopes	2,553	1.1
29B	Timberville silt loam, 0 to 7 percent slopes, occasionally flooded	1,659	0.7
30C	Timberville silt loam, 7 to 15 percent slopes, rarely flooded	8,747	3.6
31	Udorthents, nearly level	391	0.2
32	Udorthents-Urban land complex, nearly level to very steep	2,296	1.0
33C	Urban land-Frederick complex, 0 to 25 percent slopes	1,975	0.8
34C	Urban land-Marbie-Timberville complex, 0 to 15 percent slopes	1,885	0.8
35C	Weikert-Berks complex, 7 to 15 percent slopes	590	0.2
35D	Weikert-Berks complex, 15 to 35 percent slopes	620	0.3
35E	Weikert-Berks complex, 35 to 65 percent slopes	7,700	3.2
36B	Wheeling loam, 2 to 7 percent slopes	263	0.1
	Water	1,210	0.4
	Total	240,600	100.0

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
1B	Austinville silty clay loam, 2 to 7 percent slopes
3B	Botetourt silt loam, 2 to 7 percent slopes
5A	Clubcaf silt loam, 0 to 3 percent slopes, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
10B	Frederick silt loam, 2 to 7 percent slopes
11A	Gullion loam, 0 to 3 percent slopes, occasionally flooded
14B	Hagerstown-Wurno complex, 2 to 7 percent slopes
15B	Ingledove loam, 2 to 7 percent slopes
18B	Marbie-Wyrick complex, 2 to 7 percent slopes
20A	Nomberville silt loam, 0 to 3 percent slopes, occasionally flooded
21A	Pagebrook silt loam, 0 to 3 percent slopes, rarely flooded
25B	Shottower loam, 2 to 7 percent slopes
26A	Sindion loam, 0 to 3 percent slopes, occasionally flooded
27A	Speedwell sandy loam, 0 to 3 percent slopes, occasionally flooded
29B	Timberville silt loam, 0 to 7 percent slopes, occasionally flooded
36B	Wheeling loam, 2 to 7 percent slopes

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Corn silage	Wheat	Alfalfa hay	Grass-legume hay	Pasture
		Bu	Tons	Bu	Tons	Tons	AUM*
1B--Austinville	IIe	150	35	55	4.5	3.5	9.0
1C--Austinville	IIIe	135	27	45	4.5	3.5	9.0
1D--Austinville	IVe	110	22	40	4.0	3.0	8.0
2E**--Austinville-Rock outcrop	VIIs	---	---	---	---	---	---
3B--Botetourt	IIe	110	22	40	3.5	3.0	8.0
4C**--Chiswell-Groseclose-Litz	IIIe	67	10	34	3.0	2.5	7.0
4D**--Chiswell-Groseclose-Litz	IVe	---	---	---	---	---	---
4E**--Chiswell-Groseclose-Litz	VIIe	---	---	---	---	---	---
5A--Clubcaf	VIw	---	---	---	---	3.5	9.0
6C--Dekalb	IIIe	75	15	35	3.0	2.5	6.5
6D--Dekalb	VIe	---	---	---	---	---	---
6E--Dekalb	VIIe	---	---	---	---	---	---
7B--Derroc	IIIs	60	12	---	2.0	1.5	4.0
8E**--Drypond-Rock outcrop	VIIe	---	---	---	---	---	---
9A--Evansham	VIw	85	17	---	2.0	2.5	6.5
10B--Frederick	IIe	130	26	50	4.5	3.5	9.0

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Wheat	Alfalfa hay	Grass-legume hay	Pasture
		Bu	Tons	Bu	Tons	Tons	AUM*
10C---------- Frederick	IIIe	120	24	45	4.5	3.0	8.0
10D---------- Frederick	IVe	80	16	35	4.0	3.0	8.0
11A---------- Gullion	IIw	122	22	45	4.0	3.5	9.0
12C---------- Hagerstown	VIs	125	25	45	5.0	3.5	9.0
12D---------- Hagerstown	VIs	110	22	35	4.0	3.0	8.0
13E**---------- Hagerstown-Rock outcrop	VIIs	---	---	---	---	---	---
14B**---------- Hagerstown-Wurno	IIe	118	24	45	4.8	3.4	8.5
14C**---------- Hagerstown-Wurno	IIIe	109	21	40	4.4	3.4	8.5
14D**---------- Hagerstown-Wurno	IVe	95	19	30	3.5	2.9	7.5
14E**---------- Hagerstown-Wurno	VIIe	---	---	---	3.5	2.9	7.5
15B---------- Ingledove	IIe	120	23	50	5.5	3.5	9.0
16C---------- Jefferson	IVs	75	13	40	2.5	3.0	8.0
16D---------- Jefferson	VIIs	---	---	---	---	2.5	6.5
16E---------- Jefferson	VIIe	---	---	---	---	2.5	6.5
17C---------- Lily	IIIe	85	17	35	3.0	3.0	8.0
17D---------- Lily	VIe	---	---	---	---	2.5	6.5
17E---------- Lily	VIIe	---	---	---	---	---	---
18B**---------- Marbie-Wyrick	IIe	118	21	50	3.5	3.5	7.5
18C**---------- Marbie-Wyrick	IIIe	111	20	45	3.3	3.2	7.5

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Wheat	Alfalfa hay	Grass-legume hay	Pasture
		Bu	Tons	Bu	Tons	Tons	AUM*
18D**----- Marbie-Wyrick	IVe	96	17	40	3.3	3.0	7.0
19C----- Matneflat	IVs	---	---	---	---	---	---
19D----- Matneflat	VIs	---	---	---	---	---	---
19E----- Matneflat	VIIe	---	---	---	---	---	---
20A----- Nomberville	I	135	27	---	4.5	3.5	7.0
21A----- Pagebrook	IIw	85	16	55	4.0	3.5	---
22**. Pits, quarries							
23C**----- Rayne-Berks	IIIe	91	19	38	3.9	3.1	8.5
23D**----- Rayne-Berks	VIe	---	---	---	---	2.5	6.5
23E**----- Rayne-Berks	VIIe	---	---	---	---	---	---
24F**----- Rock outcrop- Wurno	VIII	---	---	---	---	---	---
25B----- Shottower	IIe	120	22	50	4.5	3.5	9.0
25C----- Shottower	IIIe	115	21	45	4.5	3.5	9.0
25D----- Shottower	IVe	110	20	40	4.0	3.0	8.0
26A----- Sindion	IIw	125	25	---	4.0	3.0	8.0
27A----- Speedwell	I	130	24	---	4.5	3.5	9.0
28C**----- Sylvatus-Sylco	IVs	---	---	---	---	2.5	6.5
28D**----- Sylvatus-Sylco	VIe	---	---	---	---	2.0	6.0
28E**----- Sylvatus-Sylco	VIIe	---	---	---	---	2.0	6.0
29B----- Timberville	IIe	125	25	---	4.5	4.0	10.5

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Wheat	Alfalfa hay	Grass-legume hay	Pasture
		Bu	Tons	Bu	Tons	Tons	AUM*
30C---------- Timberville	IIIe	100	20	40	4.0	4.0	10.5
31---------- Udorthents	VIII	---	---	---	---	---	---
32**---------- Udorthents-Urban land	VIII	---	---	---	---	---	---
33C**---------- Urban land-Frederick	---	---	---	---	---	---	---
34C**---------- Urban land-Marbie-Timberville	---	---	---	---	---	---	---
35C**---------- Weikert-Berks	IVs	---	---	---	2.4	2.2	4.6
35D**---------- Weikert-Berks	VIe	---	---	---	---	---	---
35E**---------- Weikert-Berks	VIIe	---	---	---	---	---	---
36B---------- Wheeling	IIe	125	25	45	4.5	3.5	9.0

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
1B---------- Austinville	4C	Slight	Moderate	Slight	Slight	Northern red oak----	78	4	Eastern white pine, yellow poplar.
						White oak----------	76	4	
						Yellow poplar-------	100	8	
						Virginia pine-------	81	9	
1D---------- Austinville	4R	Moderate	Moderate	Moderate	Slight	Northern red oak----	78	4	Eastern white pine, yellow poplar.
						White oak----------	76	4	
						Yellow poplar-------	100	8	
						Virginia pine-------	81	9	
2E**: Austinville----	4R	Moderate	Moderate	Moderate	Slight	Northern red oak----	78	4	Eastern white pine, yellow poplar.
						White oak----------	76	4	
						Yellow poplar-------	100	8	
						Virginia pine-------	81	9	
Rock outcrop.									
3B---------- Botetourt	4A	Slight	Slight	Slight	Slight	Northern red oak----	75	4	Eastern white pine, yellow poplar, shortleaf pine.
						Virginia pine-------	65	7	
						Yellow poplar-------	95	7	
4C**: Chiswell-------	4D	Slight	Slight	Moderate	Moderate	Northern red oak----	74	4	Eastern white pine.
						Virginia pine-------	61	6	
						Yellow poplar-------	93	7	
Groseclose-----	5A	Slight	Slight	Slight	Slight	Northern red oak----	85	5	Eastern white pine, yellow poplar.
						White oak----------	85	5	
						Eastern white pine--	90	12	
						Yellow poplar-------	86	6	
Litz----------	4F	Slight	Slight	Moderate	Slight	Northern red oak----	74	4	Virginia pine, eastern white pine, shortleaf pine.
						Virginia pine-------	61	6	
						Shortleaf pine------	72	8	
						Yellow poplar-------	93	7	
4D**: Chiswell-------	4R	Moderate	Moderate	Moderate	Moderate	Northern red oak----	74	4	Eastern white pine.
						Virginia pine-------	61	6	
						Yellow poplar-------	93	7	
Groseclose-----	5R	Moderate	Moderate	Moderate	Slight	Northern red oak----	85	5	Eastern white pine, yellow poplar.
						Yellow poplar-------	86	6	
						White oak----------	85	5	
						Eastern white pine--	90	12	
Litz----------	4F	Slight	Moderate	Moderate	Slight	Northern red oak----	80	4	Virginia pine, eastern white pine, shortleaf pine.
						Virginia pine-------	65	7	
						Yellow poplar-------	95	7	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
4E**:									
Chiswell	4R	Severe	Severe	Moderate	Moderate	Northern red oak	74	4	Eastern white pine.
						Virginia pine	61	6	
						Yellow poplar	93	7	
Groseclose	5R	Severe	Severe	Moderate	Slight	Northern red oak	85	5	Eastern white pine, yellow poplar.
						Yellow poplar	86	6	
						White oak	85	5	
						Eastern white pine	90	12	
Litz	4R	Moderate	Severe	Moderate	Slight	Northern red oak	80	4	Virginia pine, eastern white pine, shortleaf pine.
						Virginia pine	65	7	
						Yellow poplar	95	7	
5A Clubcaf	5W	Slight	Moderate	Severe	Severe	Pin oak	99	5	Pin oak, American sycamore, eastern cottonwood.
						Eastern cottonwood	95	8	
						Sweetgum	92	8	
						Red maple	---	---	
6C Dekalb	3F	Slight	Slight	Moderate	Slight	Northern red oak	57	3	Eastern white pine, Virginia pine, red pine, Austrian pine, Japanese larch.
6D Dekalb	2F	Slight	Moderate	Moderate	Slight	Northern red oak	52	2	Eastern white pine, Virginia pine, white spruce, Norway spruce.
6E Dekalb	2R	Moderate	Severe	Moderate	Slight	Northern red oak	52	2	Eastern white pine, Virginia pine, white spruce, Norway spruce.
7B Derroc	12F	Slight	Slight	Slight	Slight	Eastern white pine	90	12	Eastern white pine, yellow poplar, shortleaf pine.
						Northern red oak	70	4	
						Yellow poplar	90	6	
						Virginia pine	60	6	
8E**:									
Drypond	3R	Severe	Severe	Moderate	Moderate	Northern red oak	55	3	Eastern white pine.
						Virginia pine	45	4	
Rock outcrop.									
9A Evansham	4W	Slight	Severe	Severe	Severe	Sweetgum	70	4	Sweetgum.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
10B, 10C-------- Frederick	4C	Slight	Moderate	Slight	Slight	Northern red oak---- Yellow poplar-------- Black locust-------- White oak----------- Black walnut--------	76 86 80 76 76	4 6 4 4 4	Eastern white pine, yellow poplar, black walnut, Scotch pine.
10D---------- Frederick	4R	Moderate	Moderate	Slight	Slight	Northern red oak---- Yellow poplar-------- Black locust-------- White oak----------- Black walnut--------	76 86 80 76 76	4 6 4 4 4	Eastern white pine, yellow poplar, black walnut, Scotch pine.
11A---------- Gullion	5A	Slight	Slight	Slight	Slight	Northern red oak---- Yellow poplar-------- White ash---------- White oak-----------	86 95 85 85	5 7 4 5	Eastern white pine, yellow poplar, black walnut.
12C---------- Hagerstown	4C	Slight	Moderate	Slight	Slight	Northern red oak---- Yellow poplar--------	85 95	4 7	Black walnut, yellow poplar, eastern white pine, Norway spruce.
12D---------- Hagerstown	4C	Moderate	Severe	Slight	Slight	Northern red oak---- Yellow poplar--------	85 95	4 7	Black walnut, yellow poplar, eastern white pine, Norway spruce.
13E**: Hagerstown----- Rock outcrop.	4C	Moderate	Severe	Slight	Slight	Northern red oak---- Yellow poplar--------	85 95	4 7	Black walnut, yellow poplar, eastern white pine, Norway spruce.
14B**, 14C**: Hagerstown----- Wurno---------- 14D**: Hagerstown-----	4C 4F 4C	Slight Slight Moderate	Moderate Slight Severe	Slight Slight Slight	Slight Slight Slight	Northern red oak---- Yellow poplar-------- Scarlet oak--------- Virginia pine-------- Northern red oak---- Yellow poplar--------	85 95 70 70 85 95	4 7 4 8 4 7	Black walnut, yellow poplar, eastern white pine, Norway spruce. Virginia pine, shortleaf pine, eastern white pine. Black walnut, yellow poplar, eastern white pine, Norway spruce.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
14D**:									
Wurno	4F	Slight	Moderate	Slight	Slight	Scarlet oak	70	4	Virginia pine, shortleaf pine, eastern white pine.
						Virginia pine	70	8	
14E**:									
Hagerstown	4R	Severe	Severe	Slight	Slight	Northern red oak	85	4	Black walnut, yellow poplar, eastern white pine, Norway spruce.
						Yellow poplar	95	7	
Wurno	4R	Moderate	Severe	Slight	Slight	Scarlet oak	70	4	Virginia pine, shortleaf pine, eastern white pine.
						Virginia pine	70	8	
15B---------- Ingledove	4A	Slight	Slight	Slight	Slight	Northern red oak	80	4	Eastern white pine, yellow poplar, black walnut.
						Shortleaf pine	80	9	
						Black oak	78	4	
16C---------- Jefferson	7A	Slight	Slight	Slight	Slight	Shortleaf pine	65	7	Eastern white pine, yellow poplar, white oak.
						Yellow poplar	98	7	
						Pitch pine	---	---	
						Virginia pine	70	8	
						White oak	---	---	
						Black locust	---	---	
16D---------- Jefferson	4R	Moderate	Moderate	Slight	Slight	Northern red oak	85	4	Black walnut, yellow poplar, eastern white pine, shortleaf pine, white oak.
						Yellow poplar	108	8	
						Shortleaf pine	---	---	
						White oak	---	---	
						Cucumbertree	---	---	
16E---------- Jefferson	4R	Severe	Severe	Slight	Slight	Northern red oak	85	4	Black walnut, yellow poplar, eastern white pine, shortleaf pine, white oak.
						Yellow poplar	108	8	
						Shortleaf pine	---	---	
						White oak	---	---	
						Cucumbertree	---	---	
17C---------- Lily	7A	Slight	Moderate	Slight	Slight	Shortleaf pine	63	7	Shortleaf pine.
						Virginia pine	80	8	
						White oak	73	4	
						Yellow poplar	95	7	
						Northern red oak	78	4	
17D---------- Lily	7R	Moderate	Moderate	Slight	Slight	Shortleaf pine	63	7	Shortleaf pine.
						Virginia pine	80	8	
						White oak	73	4	
						Yellow poplar	95	7	
						Northern red oak	78	4	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
17E---------- Lily	6R	Severe	Severe	Moderate	Slight	Yellow poplar------- Shortleaf pine------ Virginia pine------- Scarlet oak--------- White oak-----------	88 57 71 66 67	6 6 8 3 3	Shortleaf pine, white oak.
18B**:									
Marbie---------	4D	Slight	Slight	Slight	Moderate	Northern red oak---- Yellow poplar------- Black walnut--------	70 85 80	4 6 4	Eastern white pine, yellow poplar, black walnut.
Wyrick---------	5A	Slight	Slight	Slight	Slight	Northern red oak---- Yellow poplar-------	85 95	5 7	Eastern white pine, yellow poplar, black walnut.
18C**:									
Marbie---------	4R	Moderate	Moderate	Slight	Moderate	Northern red oak---- Yellow poplar------- Black walnut--------	70 85 80	4 6 4	Eastern white pine, yellow poplar, black walnut.
Wyrick---------	5A	Slight	Slight	Slight	Slight	Northern red oak---- Yellow poplar-------	85 95	5 7	Eastern white pine, yellow poplar, black walnut.
18D**:									
Marbie---------	4R	Moderate	Moderate	Slight	Moderate	Northern red oak---- Yellow poplar------- Black walnut--------	70 85 80	4 6 4	Eastern white pine, yellow poplar, black walnut.
Wyrick---------	5R	Moderate	Moderate	Slight	Slight	Northern red oak---- Yellow poplar-------	85 95	5 7	Eastern white pine, yellow poplar, black walnut.
19C---------- Matneflat	3S	Slight	Slight	Moderate	Slight	Northern red oak---- Yellow poplar------- Shortleaf pine------ Eastern white pine--	65 75 60 70	3 4 6 8	Eastern white pine, shortleaf pine.
19D---------- Matneflat	4S	Moderate	Moderate	Slight	Slight	Northern red oak---- Yellow poplar------- Shortleaf pine------ Eastern white pine--	75 85 70 80	4 6 8 10	Eastern white pine, yellow poplar, shortleaf pine.
19E---------- Matneflat	4R	Severe	Severe	Slight	Slight	Northern red oak---- Yellow poplar------- Shortleaf pine------ Eastern white pine--	75 85 70 80	4 6 8 10	Eastern white pine, yellow poplar, shortleaf pine.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
20A---------- Nomberville	4A	Slight	Slight	Slight	Slight	Northern red oak----	80	4	Yellow poplar, eastern white pine, shortleaf pine.
						Virginia pine-------	70	8	
						Yellow poplar-------	90	6	
21A---------- Pagebrook	4C	Slight	Moderate	Moderate	Slight	Northern red oak----	70	4	Eastern white pine, yellow poplar, black walnut.
						Yellow poplar-------	75	4	
23C**:									
Rayne----------	4A	Slight	Slight	Slight	Slight	Northern red oak----	80	4	Eastern white pine, yellow poplar, black cherry, Virginia pine, Norway spruce.
						Yellow poplar-------	90	6	
						Eastern white pine--	90	10	
						Virginia pine-------	75	8	
						Shortleaf pine------	75	8	
Berks----------	4F	Slight	Slight	Moderate	Slight	Northern red oak----	70	4	Virginia pine, eastern white pine, Japanese larch, Norway spruce, red pine.
						Black oak----------	70	4	
						Virginia pine-------	70	8	
23D**:									
Rayne----------	4R	Slight	Moderate	Slight	Slight	Northern red oak----	80	4	Eastern white pine, yellow poplar, black cherry, Virginia pine, Norway spruce.
						Yellow poplar-------	90	6	
						Eastern white pine--	90	10	
						Virginia pine-------	75	8	
						Shortleaf pine------	75	8	
Berks----------	4F	Slight	Moderate	Moderate	Slight	Northern red oak----	70	4	Virginia pine, eastern white pine, Japanese larch, Norway spruce, red pine.
						Black oak----------	70	4	
						Virginia pine-------	70	8	
23E**:									
Rayne----------	4R	Moderate	Severe	Slight	Slight	Northern red oak----	80	4	Eastern white pine, yellow poplar, black cherry, Virginia pine, Norway spruce.
						Yellow poplar-------	90	6	
						Eastern white pine--	90	10	
						Virginia pine-------	75	8	
						Shortleaf pine------	75	8	
Berks----------	4R	Moderate	Severe	Moderate	Slight	Northern red oak----	70	4	Virginia pine, eastern white pine, Japanese larch, Norway spruce, red pine.
						Black oak----------	70	4	
						Virginia pine-------	70	8	
24F**:									
Rock outcrop.									

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
24F**:									
Wurno	4R	Moderate	Severe	Slight	Slight	Scarlet oak	70	4	Virginia pine, shortleaf pine, eastern white pine.
						Virginia pine	70	8	
25B, 25C---------- Shottower	12A	Slight	Slight	Slight	Slight	Eastern white pine	95	12	Eastern white pine, yellow poplar.
						Northern red oak	80	4	
						Yellow poplar	90	6	
						Shortleaf pine	76	8	
25D---------- Shottower	12R	Moderate	Moderate	Slight	Slight	Eastern white pine	95	12	Eastern white pine, yellow poplar.
						Northern red oak	80	4	
						Yellow poplar	90	6	
						Shortleaf pine	76	8	
26A---------- Sindion	4A	Slight	Slight	Slight	Slight	Northern red oak	80	4	Eastern white pine.
						Yellow poplar	95	7	
27A---------- Speedwell	4A	Slight	Slight	Slight	Slight	Northern red oak	80	4	Eastern white pine, yellow poplar, black walnut.
						Yellow poplar	90	6	
28C**:									
Sylvatus	3D	Slight	Slight	Moderate	Moderate	Northern red oak	55	3	Eastern white pine.
						Virginia pine	45	4	
						Yellow poplar	70	4	
Sylco	6X	Slight	Severe	Slight	Slight	Shortleaf pine	60	6	Eastern white pine, shortleaf pine, Virginia pine.
						Virginia pine	60	6	
						Eastern white pine	70	8	
28D**:									
Sylvatus	3R	Moderate	Moderate	Moderate	Moderate	Northern red oak	55	3	Eastern white pine.
						Virginia pine	45	4	
						Yellow poplar	70	4	
Sylco	6X	Slight	Severe	Slight	Slight	Shortleaf pine	60	6	Eastern white pine, shortleaf pine, Virginia pine.
						Virginia pine	60	6	
						Eastern white pine	70	8	
28E**:									
Sylvatus	3R	Severe	Severe	Moderate	Moderate	Northern red oak	55	3	Eastern white pine.
						Virginia pine	45	4	
						Yellow poplar	70	4	
Sylco	6R	Moderate	Severe	Slight	Slight	Shortleaf pine	60	6	Eastern white pine, shortleaf pine, Virginia pine.
						Virginia pine	60	6	
						Eastern white pine	70	8	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
29B, 30C-------- Timberville	6A	Slight	Slight	Slight	Slight	Yellow poplar------- Northern red oak---- Shortleaf pine------ Virginia pine-------	80 90 80 70	4 6 9 8	Yellow poplar, black walnut, eastern white pine.
33C**: Urban land.									
Frederick------	4C	Slight	Moderate	Slight	Slight	Northern red oak---- Yellow poplar------- Black locust-------- White oak---------- Black walnut--------	76 86 80 76 76	4 6 4 4 4	Eastern white pine, yellow poplar, black walnut, Scotch pine.
34C**: Urban land.									
Marbie---------	4D	Slight	Slight	Slight	Moderate	Northern red oak---- Yellow poplar------- Black walnut--------	70 85 80	4 6 4	Eastern white pine, yellow poplar, black walnut.
Timberville----	6A	Slight	Slight	Slight	Slight	Yellow poplar------- Northern red oak---- Shortleaf pine------ Virginia pine-------	80 90 80 70	4 6 9 8	Yellow poplar, black walnut, eastern white pine.
35C**: Weikert--------	3D	Slight	Slight	Severe	Moderate	Northern red oak---- Virginia pine-------	59 56	3 6	Virginia pine, shortleaf pine, red pine, eastern white pine.
Berks----------	4F	Slight	Slight	Moderate	Slight	Northern red oak---- Black oak---------- Virginia pine-------	70 70 70	4 4 8	Virginia pine, eastern white pine, Japanese larch, Norway spruce, red pine.
35D**: Weikert--------	3D	Slight	Moderate	Severe	Moderate	Northern red oak---- Virginia pine-------	64 60	3 6	Eastern white pine, shortleaf pine, Virginia pine.
Berks----------	4F	Slight	Moderate	Moderate	Slight	Northern red oak---- Black oak---------- Virginia pine-------	70 70 70	4 4 8	Virginia pine, eastern white pine, Japanese larch, Norway spruce, red pine.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
35E**:									
Weikert	3R	Moderate	Severe	Severe	Moderate	Northern red oak	64	3	Eastern white pine, shortleaf pine, Virginia pine.
						Virginia pine	60	6	
Berks	4R	Moderate	Severe	Moderate	Slight	Northern red oak	70	4	Virginia pine, eastern white pine, Japanese larch, Norway spruce, red pine.
						Black oak	70	4	
						Virginia pine	70	8	
36B	4A	Slight	Slight	Slight	Slight	Northern red oak	80	4	Eastern white pine, yellow poplar, black walnut.
Wheeling						Yellow poplar	90	6	

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe")

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1B Austinville	Slight	Slight	Moderate: slope.	Slight	Slight.
1C Austinville	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
1D Austinville	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
2E*: Austinville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
3B Botetourt	Moderate: wetness.	Moderate: wetness.	Moderate: slope, small stones, wetness.	Moderate: wetness.	Moderate: wetness, droughty.
4C*: Chiswell	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.
Groseclose	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Litz	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.
4D*: Chiswell	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: slope, small stones.
Groseclose	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Litz	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones, slope.
4E*: Chiswell	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.	Severe: slope, small stones.
Groseclose	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
4E*:					
Litz	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
5A	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
6C	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: large stones.	Severe: small stones.
6D, 6E	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope, small stones.
7B	Severe: flooding.	Moderate: large stones, small stones.	Severe: large stones, small stones.	Moderate: large stones.	Severe: large stones.
8E*:					
Drypond	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, droughty, slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
9A	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
10B	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
10C	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
10D	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
11A	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: wetness, flooding.	Moderate: wetness.	Moderate: wetness, flooding.
12C	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: large stones, slope.
12D	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
13E*:					
Hagerstown	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
13E*:					
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
14B*:					
Hagerstown	Slight	Slight	Moderate: slope, small stones.	Slight	Moderate: large stones.
Wurno	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Severe: droughty.
14C*:					
Hagerstown	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: large stones, slope.
Wurno	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Severe: droughty.
14D*:					
Hagerstown	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Wurno	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope, droughty.
14E*:					
Hagerstown	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wurno	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope, droughty.
15B Ingledove	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
16C Jefferson	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope, small stones.	Moderate: large stones.	Severe: large stones.
16D, 16E Jefferson	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope.
17C Lily	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, depth to rock.
17D, 17E Lily	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
18B*:					
Marbie	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, small stones, wetness.	Severe: erodes easily.	Slight.
Wyrick	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
18C*:					
Marbie	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Wyrick	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
18D*:					
Marbie	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Wyrick	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
19C	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, slope.
19D, 19E	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
20A	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
21A	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: small stones.	Slight	Moderate: droughty.
22*	Variable	Variable	Variable	Variable	Variable.
Pits, quarries					
23C*:					
Rayne	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Berks	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Slight	Severe: small stones.
23D*, 23E*:					
Rayne	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Berks	Severe: slope, small stones.	Severe: small stones, slope.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
24F*:					
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
Wurno	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope, droughty.
25B---Shottower	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
25C---Shottower	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
25D---Shottower	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
26A---Sindion	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Moderate: wetness.	Moderate: wetness, flooding.
27A---Speedwell	Severe: flooding.	Moderate: flooding.	Moderate: flooding.	Slight	Moderate: droughty.
28C*:					
Sylvatus	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Slight	Severe: depth to rock.
Sylco	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones.
28D*, 28E*:					
Sylvatus	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: depth to rock, slope.
Sylco	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
29B---Timberville	Severe: flooding.	Slight	Moderate: slope, small stones.	Slight	Moderate: flooding.
30C---Timberville	Severe: flooding.	Moderate: slope.	Severe: slope.	Slight	Slight.
31---Udorthents	Variable	Variable	Variable	Variable	Variable.
32*:					
Udorthents	Variable	Variable	Variable	Variable	Variable.
Urban land	Variable	Variable	Variable	Variable	Variable.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
33C*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Frederick	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
34C*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Marbie	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Slight.
Timberville	Severe: flooding.	Slight	Severe: slope.	Slight	Slight.
35C*:					
Weikert	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: slope, small stones.	Slight	Severe: droughty, depth to rock.
Berks	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Slight	Severe: small stones.
35D*:					
Weikert	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe	Severe: droughty, depth to rock.
Berks	Severe: slope, small stones.	Severe: small stones, slope.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
35E*:					
Weikert	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe	Severe: droughty, depth to rock.
Berks	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.	Severe: slope, small stones.
36B Wheeling	Slight	Slight	Moderate: slope.	Slight	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
1B---- Austinville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
1C---- Austinville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
1D---- Austinville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
2E*:										
Austinville----	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop----	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
3B---- Botetourt	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
4C*:										
Chiswell----	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Groseclose----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Litz----	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
4D*:										
Chiswell----	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Groseclose----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Litz----	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
4E*:										
Chiswell----	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Groseclose----	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Litz----	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
5A---- Clubcaf	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
6C---- Dekalb	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
6D---- Dekalb	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
6E---- Dekalb	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
7B---- Derroc	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
8E*:										
Drypond----	Very poor.	Very poor.	Fair	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Rock outcrop----	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
9A---- Evansham	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
10B---- Frederick	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
10C---- Frederick	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
10D---- Frederick	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
11A---- Gullion	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
12C---- Hagerstown	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
12D---- Hagerstown	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
13E*:										
Hagerstown----	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Rock outcrop----	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
14B*:										
Hagerstown----	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Wurno----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
14C*:										
Hagerstown----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Wurno----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
14D*:										
Hagerstown----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
14D*:										
Wurno	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
14E*:										
Hagerstown	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Wurno	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
15B---- Ingledove	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
16C---- Jefferson	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
16D---- Jefferson	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
16E---- Jefferson	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
17C---- Lily	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
17D---- Lily	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
17E---- Lily	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
18B*:										
Marbie	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Wyrick	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
18C*:										
Marbie	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Wyrick	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
18D*:										
Marbie	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Wyrick	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
19C---- Matneflat	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
19D---- Matneflat	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
19E--Matneflat	Poor	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
20A--Nomberville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
21A--Pagebrook	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
22*--Pits, quarries	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
23C*:										
Rayne	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Berks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
23D*:										
Rayne	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Berks	Very poor.	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
23E*:										
Rayne	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Berks	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
24F*:										
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Wurno	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Very poor.	Good	Very poor.
25B--Shottower	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
25C--Shottower	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
25D--Shottower	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
26A--Sindion	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
27A--Speedwell	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
28C*:										
Sylvatus	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
28C*:										
Sylco	Fair	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
28D*:										
Sylvatus	Very poor.	Very poor.	Fair	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Sylco	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
28E*:										
Sylvatus	Very poor.	Very poor.	Fair	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Sylco	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
29B---- Timberville	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Fair	Very poor.
30C---- Timberville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Fair	Very poor.
31. Udorthents										
32*: Udorthents.										
Urban land.										
33C*: Urban land.										
Frederick	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
34C*: Urban land.										
Marbie	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Timberville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Fair	Very poor.
35C*:										
Weikert	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Berks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
35D*:										
Weikert	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Berks	Very poor.	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
35E*:										
Weikert	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Berks	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
36B Wheeling	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1B Austinville	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
1C Austinville	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
1D Austinville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
2E*: Austinville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Rock outcrop	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
3B Botetourt	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: frost action.	Moderate: wetness, droughty.
4C*: Chiswell	Severe: depth to rock.	Moderate: depth to rock, slope.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Severe: small stones.
Groseclose	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell.	Severe: low strength, shrink-swell.	Moderate: slope.
Litz	Moderate: depth to rock, large stones, slope.	Moderate: slope, large stones.	Moderate: depth to rock, slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.	Severe: small stones.
4D*, 4E*: Chiswell	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
Groseclose	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Litz	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
5A---------- Clubcaf	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
6C---------- Dekalb	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, large stones.	Severe: small stones.
6D, 6E---------- Dekalb	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
7B---------- Derroc	Severe: cutbanks cave, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: large stones.
8E*: Drypond----------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: small stones, droughty, slope.
Rock outcrop-----	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
9A---------- Evansham	Severe: cutbanks cave, wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
10B---------- Frederick	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
10C---------- Frederick	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength.	Moderate: slope.
10D---------- Frederick	Severe: slope.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength, slope.	Severe: slope.
11A---------- Gullion	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, flooding, frost action.	Moderate: wetness, flooding.
12C---------- Hagerstown	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: large stones, slope.
12D---------- Hagerstown	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
13E*:						
Hagerstown	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Rock outcrop	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
14B*:						
Hagerstown	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: large stones.
Wurno	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Moderate: frost action.	Severe: droughty.
14C*:						
Hagerstown	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: large stones, slope.
Wurno	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, frost action.	Severe: droughty.
14D*, 14E*:						
Hagerstown	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Wurno	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
15B Ingledove	Slight	Slight	Slight	Moderate: slope.	Slight	Slight.
16C Jefferson	Moderate: large stones, slope.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, large stones.	Severe: large stones.
16D, 16E Jefferson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
17C Lily	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Moderate: slope, depth to rock.
17D, 17E Lily	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
18B*:						
Marbie	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Slight.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
18B*:						
Wyrick	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
18C*:						
Marbie	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
Wyrick	Moderate: slope, too clayey.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
18D*:						
Marbie	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
Wyrick	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
19C--Matneflat	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: small stones, slope.
19D, 19E--Matneflat	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
20A--Nomberville	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.	Moderate: flooding.
21A--Pagebrook	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Moderate: droughty.
22*--Pits, quarries	Variable	Variable	Variable	Variable	Variable	Variable.
23C*:						
Rayne	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Berks	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Severe: small stones.
23D*, 23E*:						
Rayne	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
24F*:						
Rock outcrop	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
Wurno	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
25B--Shottower	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
25C--Shottower	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
25D--Shottower	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
26A--Sindion	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding, frost action.	Moderate: wetness, flooding.
27A--Speedwell	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
28C*:						
Sylvatus	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Sylco	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Moderate: small stones.
28D*, 28E*:						
Sylvatus	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, slope.
Sylco	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
29B--Timberville	Moderate: too clayey, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
30C--Timberville	Moderate: too clayey, slope.	Severe: flooding.	Severe: flooding.	Severe: flooding, slope.	Moderate: slope, flooding, frost action.	Slight.
31--Udorthents	Variable	Variable	Variable	Variable	Variable	Variable.
32*:						
Udorthents	Variable	Variable	Variable	Variable	Variable	Variable.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
32*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
33C*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Frederick	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength.	Moderate: slope.
34C*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Marbie	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Slight.
Timberville	Moderate: too clayey.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Slight.
35C*:						
Weikert	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Severe: droughty, depth to rock.
Berks	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Severe: small stones.
35D*:						
Weikert	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: droughty, depth to rock.
Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
35E*:						
Weikert	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: droughty, depth to rock.
Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
36B--Wheeling	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action, low strength.	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1B Austinville	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
1C Austinville	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
1D Austinville	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
2E*: Austinville	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Rock outcrop	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
3B Botetourt	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones.
4C*: Chiswell	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
Groseclose	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Litz	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
4D*, 4E*: Chiswell	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
Groseclose	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Litz	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
5A Clubcaf	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
6C Dekalb	Severe: depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: seepage, depth to rock.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
6D, 6E Dekalb	Severe: slope, depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.
7B Derroc	Severe: flooding, poor filter, large stones.	Severe: seepage, flooding, large stones.	Severe: flooding, seepage, large stones.	Severe: flooding, seepage.	Poor: small stones.
8E*: Drypond	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
Rock outcrop	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
9A Evansham	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
10B Frederick	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
10C Frederick	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
10D Frederick	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
11A Gullion	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
12C Hagerstown	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
12D Hagerstown	Severe: slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
13E*:					
Hagerstown	Severe: slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Rock outcrop	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
14B*:					
Hagerstown	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
Wurno	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
14C*:					
Hagerstown	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
Wurno	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
14D*, 14E*:					
Hagerstown	Severe: slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Wurno	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
15B---------- Ingledove	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
16C---------- Jefferson	Moderate: slope, large stones.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: large stones.
16D, 16E---------- Jefferson	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: large stones, slope.
17C---------- Lily	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.
17D, 17E---------- Lily	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
18B*:					
Marbie	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, small stones.
Wyrick	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey, small stones.
18C*:					
Marbie	Severe: wetness, percs slowly.	Severe: slope.	Moderate: wetness, slope, too clayey.	Moderate: wetness, slope.	Fair: too clayey, small stones, slope.
Wyrick	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope, small stones.
18D*:					
Marbie	Severe: wetness, percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Wyrick	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
19C--Matneflat	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: small stones.
19D, 19E--Matneflat	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
20A--Nomberville	Severe: flooding.	Severe: flooding.	Severe: flooding, seepage.	Severe: flooding.	Good.
21A--Pagebrook	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, small stones.
22*--Pits, quarries	Variable	Variable	Variable	Variable	Variable.
23C*:					
Rayne	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Fair: small stones, thin layer, slope.
Berks	Severe: depth to rock.	Severe: slope, seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
23D*, 23E*:					
Rayne	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
Berks	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.
24F*:					
Rock outcrop	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
Wurno	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
25B	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Poor: small stones.
25C	Moderate: percs slowly, slope.	Severe: slope.	---	Moderate: slope.	Poor: small stones.
25D	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
26A	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
27A	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding.	Fair: too clayey, small stones, thin layer.
28C*:					
Sylvatus	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
Sylco	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
28D*, 28E*:					
Sylvatus	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
Sylco	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
29B Timberville	Severe: flooding.	Severe: flooding.	Severe: flooding, too clayey.	Severe: flooding.	Poor: too clayey, hard to pack, small stones.
30C Timberville	Moderate: flooding, percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: flooding, slope.	Poor: too clayey, hard to pack, small stones.
31. Udorthents	Variable	Variable	Variable	Variable	Variable.
32*: Udorthents	Variable	Variable	Variable	Variable	Variable.
Urban land	Variable	Variable	Variable	Variable	Variable.
33C*: Urban land	Variable	Variable	Variable	Variable	Variable.
Frederick	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
34C*: Urban land	Variable	Variable	Variable	Variable	Variable.
Marbie	Severe: wetness, percs slowly.	Severe: slope.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, small stones.
Timberville	Moderate: flooding, percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: flooding.	Poor: too clayey, hard to pack, small stones.
35C*: Weikert	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock.	Poor: depth to rock, seepage, small stones.
Berks	Severe: depth to rock.	Severe: slope, seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
35D*: Weikert	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, seepage, small stones.
Berks	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
35E*:					
Weikert	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, seepage, small stones.
Berks	Severe: depth to rock, slope.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: seepage, slope, depth to rock.	Poor: small stones, slope, area reclaim.
36B---------- Wheeling	Moderate: percs slowly.	Moderate: seepage.	Slight----------	Slight----------	Fair: thin layer.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1B, 1C, 1D---------- Austinville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
2E*:				
Austinville----------	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Rock outcrop---------	Poor: depth to rock, slope.	---	---	Poor: depth to rock, slope.
3B---------- Botetourt	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
4C*:				
Chiswell----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
Groseclose----------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Litz----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
4D*:				
Chiswell----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Groseclose----------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
Litz----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
4E*:				
Chiswell----------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Groseclose----------	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
4E*:				
Litz	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
5A	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Clubcaf				
6C	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Dekalb				
6D, 6E	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Dekalb				
7B	Poor: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: area reclaim, small stones.
Derroc				
8E*:				
Drypond	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Rock outcrop	Poor: depth to rock, slope.	---	---	Poor: depth to rock, slope.
9A	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Evansham				
10B, 10C	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Frederick				
10D	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
Frederick				
11A	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, area reclaim.
Gullion				
12C	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Hagerstown				
12D	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Hagerstown				
13E*:				
Hagerstown	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
13E*:				
Rock outcrop	Poor: depth to rock, slope.	---	---	Poor: depth to rock, slope.
14B*, 14C*:				
Hagerstown	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Wurno	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
14D*:				
Hagerstown	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Wurno	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
14E*:				
Hagerstown	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Wurno	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
15B Ingledove	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
16C Jefferson	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim.
16D, 16E Jefferson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
17C Lily	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
17D, 17E Lily	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
18B*, 18C*:				
Marbie	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Wyrick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
18D*:				
Marbie	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
18D*:				
Wyrick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
19C	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
19D, 19E	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
20A	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, area reclaim.
21A	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
22*	Variable	Variable	Variable	Variable.
Pits, quarries				
23C*:				
Rayne	Fair: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Berks	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
23D*, 23E*:				
Rayne	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Berks	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
24F*:				
Rock outcrop	Poor: depth to rock, slope.	---	---	Poor: depth to rock, slope.
Wurno	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
25B, 25C	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
25D Shottower	Fair: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
26A Sindion	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
27A Speedwell	Good	Probable	Probable	Poor: area reclaim.
28C*: Sylvatus	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
Sylco	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
28D*, 28E*: Sylvatus	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Sylco	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
29B, 30C Timberville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
31 Udorthents	Variable	Variable	Variable	Variable.
32*: Udorthents	Variable	Variable	Variable	Variable.
Urban land	Variable	Variable	Variable	Variable.
33C*: Urban land	Variable	Variable	Variable	Variable.
Frederick	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
34C*: Urban land	Variable	Variable	Variable	Variable.
Marbie	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Timberville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
35C*:				
Weikert	Poor: depth to rock.	Improbable: small stones.	Improbable: thin layer.	Poor: depth to rock, small stones.
Berks	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
35D*:				
Weikert	Poor: depth to rock, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: depth to rock, small stones, slope.
Berks	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
35E*:				
Weikert	Poor: depth to rock, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: depth to rock, small stones, slope.
Berks	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
36B Wheeling	Fair: low strength.	Probable	Probable	Fair: small stones.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1B---------- Austinville	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope----------	Favorable------	Favorable.
1C, 1D---------- Austinville	Severe: slope.	Severe: hard to pack.	Deep to water	Slope----------	Slope----------	Slope.
2E*:						
Austinville------	Severe: slope.	Severe: hard to pack.	Deep to water	Slope----------	Slope----------	Slope.
Rock outcrop-----	Severe: depth to rock, slope.	---	---	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
3B---------- Botetourt	Moderate: seepage, slope.	Severe: wetness.	Frost action, slope.	Slope, wetness, droughty.	Wetness--------	Droughty.
4C*, 4D*, 4E*:						
Chiswell---------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Slope, large stones, droughty.
Groseclose-------	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Litz----------	Severe: slope.	Severe: thin layer.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
5A---------- Clubcaf	Moderate: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
6C, 6D, 6E-------- Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Slope, large stones, droughty.
7B---------- Derroc	Severe: seepage.	Severe: seepage, large stones.	Deep to water	Large stones, droughty.	Large stones---	Large stones, droughty.
8E*:						
Drypond----------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop-----	Severe: depth to rock, slope.	---	---	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
9A---------- Evansham	Slight---------	Severe: hard to pack, wetness.	Percs slowly, flooding, frost action.	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
10B---------- Frederick	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope----------	Favorable------	Favorable.
10C, 10D---------- Frederick	Severe: slope.	Severe: hard to pack.	Deep to water	Slope----------	Slope----------	Slope.
11A---------- Gullion	Severe: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, flooding.	Wetness--------	Favorable.
12C, 12D---------- Hagerstown	Severe: slope.	Moderate: hard to pack.	Deep to water	Slope----------	Slope----------	Slope.
13E*:						
Hagerstown-------	Severe: slope.	Moderate: hard to pack.	Deep to water	Slope----------	Slope----------	Slope.
Rock outcrop-----	Severe: depth to rock, slope.	---	---	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
14B*:						
Hagerstown-------	Moderate: seepage, depth to rock, slope.	Moderate: hard to pack.	Deep to water	Slope----------	Favorable------	Favorable.
Wurno----------	Moderate: seepage, depth to rock, slope.	Severe: thin layer, piping.	Deep to water	Depth to rock, slope, droughty.	Depth to rock	Depth to rock, droughty.
14C*, 14D*, 14E*:						
Hagerstown-------	Severe: slope.	Moderate: hard to pack.	Deep to water	Slope----------	Slope----------	Slope.
Wurno----------	Severe: slope.	Severe: thin layer, piping.	Deep to water	Depth to rock, slope, droughty.	Slope, depth to rock.	Slope, depth to rock, droughty.
15B---------- Ingledove	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope----------	Favorable------	Favorable.
16C, 16D, 16E----- Jefferson	Severe: seepage, slope.	Severe: piping.	Deep to water	Large stones, slope.	Slope, large stones.	Large stones, slope.
17C---------- Lily	Severe: seepage.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
17D, 17E---------- Lily	Severe: seepage, slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
18B*:						
Marbie	Moderate: seepage, slope.	Moderate: wetness.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, rooting depth.
Wyrick	Moderate: seepage, slope.	Slight	Deep to water	Slope	Favorable	Favorable.
18C*, 18D*:						
Marbie	Severe: slope.	Moderate: wetness.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
Wyrick	Severe: slope.	Slight	Deep to water	Slope	Slope	Slope.
19C, 19D, 19E----- Matneflat	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
20A---------- Nomberville	Severe: seepage.	Severe: piping.	Deep to water	Flooding	Favorable	Favorable.
21A---------- Pagebrook	Slight	Severe: hard to pack.	Percs slowly---	Wetness, droughty.	Erodes easily, wetness, percs slowly.	Erodes easily, droughty, percs slowly.
22*---------- Pits, quarries	Variable	Variable	Variable	Variable	Variable	Variable.
23C*, 23D*, 23E*:						
Rayne	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
Berks	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty, depth to rock.	Depth to rock, slope, large stones.	Droughty, depth to rock, slope.
24F*:						
Rock outcrop-----	Severe: depth to rock, slope.	---	---	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Wurno	Severe: slope.	Severe: thin layer, piping.	Deep to water	Depth to rock, slope, droughty.	Slope, depth to rock.	Slope, depth to rock, droughty.
25B---------- Shottower	Moderate: seepage, slope.	Moderate: hard to pack.	Deep to water	Slope	Favorable	Favorable.
25C, 25D---------- Shottower	Severe: slope.	Moderate: hard to pack.	Deep to water	Slope	Slope	Slope.
26A---------- Sindion	Severe: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, flooding.	Wetness	Favorable.
27A---------- Speedwell	Severe: seepage.	Severe: piping.	Deep to water	Flooding	Favorable	Favorable.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
28C*, 28D*, 28E*:						
Sylvatus	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Sylco	Severe: slope.	Severe: piping.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
29B Timberville	Moderate: seepage, slope.	Moderate: piping, hard to pack.	Deep to water	Slope, flooding.	Favorable	Favorable.
30C Timberville	Severe: slope.	Moderate: piping, hard to pack.	Deep to water	Slope	Slope	Slope.
31 Udorthents	Variable	Variable	Variable	Variable	Variable	Variable.
32*:						
Udorthents	Variable	Variable	Variable	Variable	Variable	Variable.
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
33C*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Frederick	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
34C*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Marbie	Moderate: seepage, slope.	Moderate: wetness.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, rooting depth.
Timberville	Moderate: seepage, slope.	Moderate: piping, hard to pack.	Deep to water	Slope	Favorable	Favorable.
35C*, 35D*, 35E*:						
Weikert	Severe: depth to rock, slope.	Severe: seepage.	Deep to water		Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Berks	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty, depth to rock.	Depth to rock, slope, large stones.	Droughty, depth to rock, slope.
36B Wheeling	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Favorable	Favorable.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
1B, 1C, 1D------- Austinville	0-8	Silty clay loam	CL	A-6, A-7	0-2	100	90-100	87-100	80-95	35-50	15-30
	8-79	Silty clay loam, silty clay, clay.	CL, CH	A-7	0-2	95-100	85-100	80-100	75-95	45-70	25-45
2E*: Austinville----- Rock outcrop----	0-8	Silty clay loam	CL	A-6, A-7	0-2	100	90-100	87-100	80-95	35-50	15-30
	8-79	Silty clay loam, silty clay, clay.	CL, CH	A-7	0-2	95-100	85-100	80-100	75-95	45-70	25-45
	---	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
3B--------------- Botetourt	0-9	Silt loam---------	ML, CL-ML, CL	A-4, A-6	0-5	80-100	75-95	60-85	50-80	15-35	NP-15
	9-72	Gravelly sandy clay loam, clay loam, loam.	GC, SC, CL	A-2, A-6, A-7-6	0-10	60-100	50-95	40-90	20-80	30-45	10-20
4C*: Chiswell-------- Groseclose------ Litz------------	0-3	Very channery silt loam.	GC, SC	A-2, A-4, A-6	3-20	40-65	25-50	20-45	15-40	25-40	8-20
	3-13	Very channery silt loam, extremely channery clay loam.	GC, GP-GC, SC	A-2, A-6, A-7-6	0-20	15-65	10-50	10-45	8-40	25-50	10-30
	13	Weathered bedrock	---	---	---	---	---	---	---	---	---
	0-8	Silt loam---------	SC-SM, SC, CL-ML, CL	A-2, A-4, A-6	0	80-100	75-100	50-100	30-90	20-35	5-15
	8-40	Clay, silty clay loam, clay loam.	CH	A-7	0	80-100	75-100	70-100	50-95	35-65	20-45
	40-72	Silt loam, clay loam, clay.	SC, CL, CH	A-4, A-6, A-7	0	80-100	75-100	50-100	30-90	20-65	5-45
	0-7	Channery silt loam.	GM, GC, ML, CL	A-4, A-2	7-20	60-85	30-75	30-70	30-65	<25	NP-10
	7-35	Very channery silt loam, channery silty clay loam.	GM, GC, GM-GC	A-2, A-4, A-6	15-20	40-60	15-60	14-50	13-45	<30	NP-15
	35	Weathered bedrock	---	---	---	---	---	---	---	---	---
4D*, 4E*: Chiswell--------	0-3	Very channery silt loam.	GC, SC	A-2, A-4, A-6	3-20	40-65	25-50	20-45	15-40	25-40	8-20
	3-13	Very channery silt loam, extremely channery clay loam.	GC, GP-GC, SC	A-2, A-6, A-7-6	0-20	15-65	10-50	10-45	8-40	25-50	10-30
	13	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
4D*, 4E*:											
Groseclose	0-8	Silt loam	SM-SC, SC, CL-ML, CL	A-2, A-4, A-6	0	80-100	75-100	50-100	30-90	20-35	5-15
	8-40	Clay, silty clay loam, clay loam.	CH	A-7	0	80-100	75-100	70-100	50-95	35-65	20-45
	40-72	Silt loam, clay loam, clay.	ML, CL, CH	A-4, A-6, A-7	0	80-100	75-100	50-100	30-90	20-65	5-45
Litz	0-7	Channery silt loam.	GM, GC, ML, CL	A-4, A-2	7-20	60-85	30-75	30-70	30-65	<25	NP-10
	7-35	Very channery silt loam, channery silty clay loam.	GM, GC, GM-GC	A-2, A-4, A-6	15-20	40-60	15-60	14-50	13-45	<30	NP-15
	35	Weathered bedrock	---	---	---	---	---	---	---	---	---
5A	0-7	Silt loam	CL-ML, ML	A-4	0	95-100	90-100	80-100	80-95	25-35	4-10
Clubcaf	7-41	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	80-100	25-40	5-20
	41-62	Silt loam, silty clay loam, very gravelly silt loam.	CL, CL-ML, SC	A-4, A-6	0	85-100	30-100	30-100	25-100	25-40	5-20
6C, 6D, 6E	0-9	Channery sandy loam.	SM, GM, ML, CL-ML	A-2, A-4, A-1	0-30	50-90	45-80	40-75	20-55	10-32	NP-10
Dekalb	9-28	Channery sandy loam, channery loam, very channery sandy loam.	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-80	40-75	20-55	15-32	NP-9
	28-35	Channery sandy loam, flaggy sandy loam, extremely channery sandy loam.	SM, GM, SC, GC	A-2, A-4, A-1	10-50	45-85	25-75	20-65	15-40	15-32	NP-9
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
7B	0-6	Cobbly sandy loam	ML, SM, CL-ML, SC	A-2, A-4	15-40	80-95	65-95	50-80	25-60	<25	NP-10
Derroc	6-28	Gravelly sandy loam, very cobbly sandy loam, extremely cobbly sandy loam.	SM, GM, GC, SC	A-1, A-2, A-4	25-60	50-80	30-65	25-60	15-40	<25	NP-10
	28-61	Very cobbly loamy sand, very cobbly sandy loam, extremely cobbly sandy loam.	GC, GM, GP-GM, GM-GC	A-1, A-2	35-70	35-55	30-50	20-45	10-25	<25	NP-8

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
8E*:											
Drypond	0-2	Very gravelly sandy loam.	GW-GC, GM-GC, GC	A-1, A-2, A-4	0-20	35-75	25-50	20-45	10-45	<25	NP-10
	2-14	Very gravelly loam, very gravelly sandy loam, extremely channery sandy clay loam.	GW-GC, GM-GC, GC	A-1, A-2, A-4	5-25	35-75	15-50	10-45	10-40	<30	NP-15
	14-18	Very gravelly sandy loam, extremely gravelly sandy loam, extremely channery sandy clay loam.	GW-GC, GM-GC, GC GM-GC, GC	A-1, A-2	10-30	15-60	10-50	10-45	5-35	<30	NP-15
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop	---	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
9A	0-7	Silty clay loam	CL, CH	A-7	0-2	95-100	92-100	85-95	65-90	40-55	20-35
Evansham	7-22	Silty clay loam, silty clay, clay.	CL, CH	A-7	0-2	95-100	92-100	85-95	65-90	40-55	20-35
	22-63	Clay loam, silty clay loam, gravelly clay loam.	CH	A-7	0-2	95-100	65-100	60-95	55-90	50-75	30-50
	63-75	Loam, silty clay loam, gravelly loam.	CL, CH	A-6, A-7	0-2	90-100	65-100	55-95	50-90	35-60	20-35
10B, 10C, 10D	0-7	Silt loam	ML, CL, CL-ML	A-4, A-6	0-5	80-100	75-100	75-95	75-90	<35	NP-15
Frederick	7-72	Clay, silty clay	CH, CL	A-7	0-5	90-100	85-100	70-100	60-95	40-85	15-55
11A	0-10	Loam	ML, CL, CL-ML	A-4, A-6	0	100	95-100	80-100	55-90	20-35	2-15
Gullion	10-42	Silty clay loam, silt loam, clay loam.	CL, CL-ML	A-4, A-6	0	100	95-100	90-100	70-95	25-40	4-18
	42-62	Stratified silty clay loam to gravelly sandy loam.	CL, CL-ML, SC, SM-SC	A-2, A-4, A-6	0	60-100	55-100	45-100	30-95	20-40	4-18
12C, 12D	0-7	Silt loam	CL, CL-ML	A-4, A-6, A-7	0-15	85-100	80-100	80-100	70-95	25-50	5-25
Hagerstown	7-42	Clay, clay loam, loam.	CL, CH	A-7	0-5	90-100	80-100	75-100	55-95	48-65	26-34
	42-55	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0-5	85-100	80-100	75-100	75-95	30-70	15-40
	55	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
13E*:											
Hagerstown------	0-7	Silt loam--------	CL, CL-ML	A-4, A-6, A-7	0-15	85-100	80-100	80-100	70-95	25-50	5-25
	7-42	Clay, clay loam, loam.	CL, CH	A-7	0-5	90-100	80-100	75-100	55-95	48-65	26-34
	42-55	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0-5	85-100	80-100	75-100	75-95	30-70	15-40
	55	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop----	---	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
14B*, 14C*, 14D*, 14E*:											
Hagerstown-----	0-7	Silt loam--------	CL, CL-ML	A-4, A-6, A-7	0-15	85-100	80-100	80-100	70-95	25-50	5-25
	7-42	Clay, clay loam, loam.	CL, CH	A-7	0-5	90-100	80-100	75-100	55-95	48-65	26-34
	42-55	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0-5	85-100	80-100	75-100	75-95	30-70	15-40
	55	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Wurno----------	0-6	Channery silt loam.	GM, GC, ML, CL	A-2, A-4	0-5	60-100	50-95	30-95	20-85	<30	NP-10
	6-16	Silty clay loam, channery silt loam, extremely channery silt loam.	GM, GC, ML, CL	A-1, A-2, A-4, A-6	0-5	40-100	10-85	5-80	5-75	<30	NP-15
	16-25	Channery silt loam, extremely channery silt loam, extremely channery loam.	GM, GC, ML, CL	A-1, A-2, A-4	0-5	30-100	10-85	5-80	5-75	<30	NP-10
	25-32	Weathered bedrock	---	---	---	---	---	---	---	---	---
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
15B----------	0-10	Loam----------	ML, CL-ML	A-4	0	90-100	80-100	65-100	55-95	<35	NP-10
Ingledove	10-45	Clay loam, loam, sandy clay loam.	ML, CL, SM, SC	A-4, A-6	0	90-100	80-100	65-95	35-80	<35	NP-15
	45-72	Clay loam, gravelly sandy loam, very gravelly loam.	SM, GC, ML, CL	A-1, A-2, A-4, A-6	0-5	65-100	35-100	35-95	20-70	<35	NP-15
16C, 16D, 16E----	0-3	Cobbly loam------	SM, GM, ML, CL	A-2, A-4	10-35	65-90	60-90	50-80	30-60	20-35	2-10
Jefferson	3-30	Cobbly loam, loam, gravelly sandy clay loam.	SM, SC, ML, CL	A-2, A-4, A-6	10-35	75-90	70-90	50-80	30-70	20-40	2-15
	30-68	Cobbly loam, cobbly clay loam, gravelly sandy clay loam.	GM, SM, ML, GM-GC	A-1, A-2, A-4	10-35	55-75	50-75	35-70	20-60	20-35	2-10

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
17C, 17D, 17E---- Lily	0-4	Sandy loam-------	SM	A-4, A-2	0-5	90-100	85-100	55-80	25-50	<20	NP-4
	4-28	Clay loam, sandy clay loam, loam.	SM, SC, ML, CL	A-4, A-6	0-5	90-100	85-100	75-100	40-80	<35	3-15
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
18B*, 18C*, 18D*: Marbie----------	0-9	Silt loam--------	CL	A-4, A-6	0-2	85-100	75-100	65-95	55-75	25-40	8-20
	9-21	Silt loam, loam, clay loam.	CL	A-6, A-7	0-5	80-100	75-100	65-100	55-80	30-45	15-30
	21-46	Loam, clay loam, gravelly clay loam.	CL	A-6, A-7	0-10	80-100	60-100	55-95	50-90	30-45	15-30
	46-62	Clay loam, silty clay loam, clay.	CL, CH	A-6, A-7	0-5	85-100	75-100	65-95	55-85	35-60	15-35
Wyrick----------	0-13	Silt loam--------	CL	A-4, A-6	0-5	90-100	75-100	60-90	55-85	25-40	8-20
	13-22	Silt loam, loam, silty clay loam.	CL	A-4, A-6, A-7	0-5	90-100	75-100	70-95	55-90	30-45	8-25
	22-46	Silty clay loam, clay loam.	CL	A-6, A-7	0-5	90-100	75-100	70-95	60-90	30-50	15-30
	46-63	Silty clay loam, clay, silty clay.	CL, CH	A-7	0-5	90-100	75-100	70-95	65-95	40-65	20-40
19C, 19D, 19E---- Matneflat	0-4	Stony sandy loam	SM, SM-SC, SP-SM	A-1, A-2	3-10	75-95	50-75	25-50	12-30	<25	NP-5
	4-38	Sandy loam, gravelly sandy loam, gravelly coarse sandy loam.	SM, SM-SC, SC	A-1, A-2, A-4	3-15	75-95	50-90	30-55	15-40	<25	3-10
	38-62	Gravelly sandy loam, very gravelly coarse sandy loam, very gravelly loamy sand.	SM, GM, GP-GM, SP-SM	A-1	10-35	50-85	40-80	20-50	12-25	<25	NP
20A---------- Nomberville	0-12	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	95-100	90-100	80-100	25-40	5-15
	12-67	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6, A-7	0	100	95-100	85-100	65-100	25-50	5-25
21A---------- Pagebrook	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	90-100	85-100	75-100	65-90	24-38	5-16
	8-26	Clay, silty clay, gravelly clay loam.	CH, SC, GC	A-7	0	60-100	50-100	45-100	40-95	50-90	30-65
	26-34	Silty clay, gravelly clay loam, clay.	CH	A-7	0-5	55-100	50-95	35-95	30-90	50-80	30-50
	34-63	Silty clay, very gravelly clay loam, clay.	CH	A-7	0-5	50-100	40-95	35-95	30-90	50-75	30-45
22*---------- Pits, quarries	0-60	Variable---------	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
23C*, 23D*, 23E*:											
Rayne	0-6	Silt loam	ML, CL	A-4	0-5	85-100	80-100	70-85	60-80	---	---
	6-47	Silty clay loam, channery silty clay loam, channery clay loam.	GM, ML, GC, CL	A-4, A-6, A-2	0-15	60-95	55-85	40-85	30-60	20-40	2-15
	47-58	Channery sandy loam, very channery silt loam, channery silty clay loam.	SM, ML, GM, GP-GM	A-4, A-2, A-1	0-35	40-90	15-80	15-75	10-60	20-35	NP-10
	58	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Berks	0-4	Channery silt loam.	GM, ML, GC, SC	A-2, A-4	0-30	50-80	45-70	40-60	30-55	25-36	5-10
	4-19	Channery loam, very channery silt loam, channery silt loam.	GM, SM, GC, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	19-27	Channery loam, very channery loam, extremely channery silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	27	Weathered bedrock	---	---	---	---	---	---	---	---	---
24F*:											
Rock outcrop	---	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Wurno	0-6	Channery silt loam.	GM, GC, ML, CL	A-2, A-4	0-5	60-100	50-95	30-95	20-85	<30	NP-10
	6-11	Silty clay loam, channery silt loam, extremely channery silt loam.	GM, GC, ML, CL	A-1, A-2, A-4, A-6	0-5	40-100	10-85	5-80	5-75	<30	NP-15
	11-25	Channery silt loam, extremely channery silt loam, extremely channery loam.	GM, GC, ML, CL	A-1, A-2, A-4	0-5	30-100	10-85	5-80	5-75	<30	NP-10
	25-32	Weathered bedrock	---	---	---	---	---	---	---	---	---
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
25B, 25C, 25D---- Shottower	0-10	Loam	CL	A-4, A-6	0-2	90-100	75-100	60-95	50-85	20-35	5-15
	10-19	Silty clay loam, clay loam, gravelly silty clay.	CL, CH	A-6, A-7	0-10	70-100	60-100	55-95	50-90	35-55	10-35
	19-72	Silty clay loam, clay, gravelly silty clay.	CH, CL, GC	A-7	0-10	65-100	55-100	50-85	45-80	35-65	15-40

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
26A---------- Sindion	0-10	Loam----------	ML, CL-ML, CL	A-4	0-2	95-100	90-100	80-100	65-90	20-30	NP-8
	10-41	Loam, clay loam, silty clay loam.	ML, CL, CL-ML, SM	A-4, A-6	0-2	75-100	50-100	50-95	45-85	20-40	NP-15
	41-65	Loam, very cobbly sandy loam, clay loam.	ML, SM, CL, SM-SC	A-2, A-4, A-1-b	10-20	35-100	15-100	15-85	10-80	15-35	NP-10
27A---------- Speedwell	0-18	Sandy loam-------	ML, CL, SM, SC	A-2, A-4	0	90-100	90-100	55-85	30-55	15-25	NP-8
	18-42	Sandy clay loam, loam, gravelly sandy loam.	ML, CL, SM, SC	A-4, A-6	0-5	75-100	50-100	50-95	45-85	20-40	2-20
	42-72	Gravelly coarse sandy loam, extremely gravelly loam, clay loam.	ML, SM, GP, GW	A-1, A-2, A-3, A-4	10-20	35-100	15-100	10-75	4-65	<20	NP-10
28C*, 28D*, 28E*: Sylvatus--------	0-3	Channery silt loam.	CL-ML, CL, GM-GC, SC	A-2, A-4, A-6	3-15	55-90	50-75	40-70	30-65	25-40	4-15
	3-15	Channery silt loam, very channery silty clay loam, extremely channery silt loam.	GM-GC, GC, SC, GP-GC	A-2, A-4, A-6, A-7	3-20	15-65	10-50	10-45	8-40	25-50	4-25
	15-18	Very channery silt loam, extremely channery silty clay loam, extremely channery silt loam.	GM-GC, GW-GC, GP-GC	A-1, A-2	3-35	15-45	10-35	10-25	8-15	25-40	4-15
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Sylco----------	0-7	Channery silt loam.	ML, CL-ML, GM, GM-GC	A-4	0-7	70-90	55-85	50-75	45-70	<30	4-10
	7-25	Very channery silt loam, flaggy loam, very channery silty clay loam.	CL-ML, CL, GC, GM-GC	A-4	8-20	55-85	30-80	25-75	20-70	20-30	5-10
	25-35	Extremely channery silt loam, silty clay loam.	GC, GM-GC, SC, SM-SC	A-2, A-4, A-1-b	20-45	35-70	30-65	25-55	20-45	20-30	5-10
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
29B, 30C--------- Timberville	0-5	Silt loam---------	ML, CL-ML, SM-SC, SM	A-4	0-3	85-100	75-100	55-95	35-85	<25	NP-7
	5-28	Silt loam, silty clay loam, gravelly loam.	CL, CL-ML, GC, GM-GC	A-4, A-6	0-5	55-100	50-100	40-90	35-85	15-40	5-20
	28-72	Clay, silty clay loam, gravelly clay loam, silt loam.	CL, CH, SC, GC	A-6, A-7	0-10	55-95	50-95	45-90	40-85	35-60	14-32
31--------------- Udorthents	---	Variable---------	---	---	---	---	---	---	---	---	---
32*: Udorthents------	---	Variable---------	---	---	---	---	---	---	---	---	---
Urban land------	---	Variable---------	---	---	---	---	---	---	---	---	---
33C*: Urban land------	---	Variable---------	---	---	---	---	---	---	---	---	---
Frederick-------	0-7	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-5	80-100	75-100	75-95	75-90	<35	NP-15
	7-72	Clay, silty clay	CH, CL	A-7	0-5	90-100	85-100	70-100	60-95	60-85	30-55
34C*: Urban land------	---	Variable---------	---	---	---	---	---	---	---	---	---
Marbie----------	0-9	Silt loam--------	CL	A-4, A-6	0-2	85-100	75-100	65-95	55-75	25-40	8-20
	9-21	Silt loam, loam, clay loam.	CL	A-6, A-7	0-5	80-100	75-100	65-100	55-80	30-45	15-30
	21-46	Silt loam, clay loam, gravelly clay loam.	CL	A-6, A-7	0-10	80-100	60-100	55-95	50-90	30-45	15-30
	46-62	Clay loam, silty clay loam, clay.	CL, CH	A-6, A-7	0-5	85-100	75-100	65-95	55-85	35-60	15-35
Timberville-----	0-5	Silt loam--------	ML, CL-ML, SM-SC, SM	A-4	0-3	85-100	75-100	55-95	35-85	<25	NP-7
	5-28	Silt loam, silty clay loam, gravelly loam.	CL, CL-ML, GC, GM-GC	A-4, A-6	0-5	55-100	50-100	40-90	35-85	15-40	5-20
	28-72	Clay, silty clay loam, gravelly clay loam, silt loam.	CL, CH, SC, GC	A-6, A-7	0-10	55-95	50-95	45-90	40-85	35-60	14-32
35C*, 35D*: Weikert---------	0-6	Channery silt loam.	GM, ML, SM	A-1, A-2, A-4	0-10	35-70	35-70	25-65	20-55	30-40	4-10
	6-12	Channery loam, very channery silt loam, very channery loam.	GM, GP-GM	A-1, A-2	0-20	15-60	10-55	5-45	5-35	28-36	3-9
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
35C*, 35D*:											
Berks	0-4	Channery silt loam.	GM, ML, GC, SC	A-2, A-4	0-30	50-80	45-70	40-60	30-55	25-36	5-10
	4-19	Channery loam, very channery silt loam, channery silt loam.	GM, SM, GC, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	19-27	Channery loam, very channery loam, extremely channery silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	27	Weathered bedrock	---	---	---	---	---	---	---	---	---
35E*:											
Weikert	0-6	Channery silt loam.	GM, ML, SM	A-1, A-2, A-4	0-10	35-70	35-70	25-65	20-55	30-40	4-10
	6-12	Channery loam, very channery silt loam, very channery loam.	GM, GP-GM	A-1, A-2	0-20	15-60	10-55	5-45	5-35	28-36	3-9
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Berks	0-4	Channery silt loam.	GM, ML, GC, SC	A-2, A-4	0-20	50-80	45-70	40-60	30-55	25-36	5-10
	4-19	Channery loam, very channery silt loam, channery silt loam.	GM, GC, SM, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	19-27	Channery loam, very channery loam, extremely channery silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	27	Weathered bedrock	---	---	---	---	---	---	---	---	---
36B	0-9	Loam	ML, CL, SM, SC	A-4	0	90-100	90-100	85-100	45-90	15-35	NP-10
Wheeling	9-65	Silty clay loam, loam, gravelly sandy loam, very fine sandy loam.	ML, CL, SM, SC	A-4, A-6	0-5	90-100	70-100	65-100	45-80	20-40	2-20

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
1B, 1C, 1D------- Austinville	0-8 8-79	27-40 35-85	1.35-1.45 1.30-1.40	0.6-2.0 0.6-2.0	0.12-0.16 0.10-0.16	4.5-7.3 4.5-7.3	Moderate----- Moderate-----	0.42 0.37	5	.5-2
2E*: Austinville----- Rock outcrop.	0-8 8-79	27-40 35-85	1.35-1.45 1.30-1.40	0.6-2.0 0.6-2.0	0.12-0.16 0.10-0.16	4.5-7.3 4.5-7.3	Moderate----- Moderate-----	0.42 0.37	5	.5-2
3B--------------- Botetourt	0-9 9-72	7-27 18-35	1.35-1.60 1.45-1.70	0.6-2.0 0.6-2.0	0.15-0.20 0.07-0.15	5.1-6.5 5.1-6.5	Low---------- Low----------	0.32 0.28	5	.5-4
4C*, 4D*, 4E*: Chiswell-------- Groseclose------ Litz---------- 	0-3 3-13 13 0-8 8-40 40-72 0-7 7-35 35	10-27 10-35 --- 7-27 35-60 20-60 10-27 10-35 ---	1.20-1.40 1.20-1.60 --- 1.25-1.55 1.35-1.60 1.35-1.60 1.20-1.50 1.20-1.50 ---	0.6-2.0 0.6-2.0 --- 2.0-6.0 0.06-0.2 0.06-0.2 0.6-2.0 0.6-2.0 ---	0.10-0.12 0.04-0.10 --- 0.11-0.20 0.10-0.17 0.12-0.19 0.13-0.16 0.10-0.16 ---	3.6-6.0 3.6-6.0 --- 3.6-5.5 3.6-5.5 3.6-5.5 4.5-5.5 4.5-5.5 ---	Low---------- Low---------- --- Low---------- High--------- High--------- Low---------- Low---------- ---	0.20 0.10 --- 0.43 0.24 0.24 0.32 0.32 ---	2 4 3 	.5-2 1-2 .5-2
5A--------------- Clubcaf	0-7 7-41 41-62	12-20 18-35 18-35	1.35-1.60 1.40-1.65 1.40-1.65	0.6-2.0 0.6-2.0 0.6-2.0	0.14-0.23 0.14-0.23 0.13-0.23	5.6-7.8 5.6-7.8 5.6-7.8	Low---------- Low---------- Low----------	0.28 0.37 0.37	5	2-4
6C, 6D, 6E------- Dekalb	0-9 9-28 28-35 35	10-20 7-18 5-15 ---	1.20-1.50 1.20-1.50 1.20-1.50 ---	6.0-20 6.0-20 >6.0 ---	0.08-0.12 0.06-0.12 0.05-0.10 ---	3.6-5.5 3.6-5.5 3.6-5.5 ---	Low---------- Low---------- Low---------- ---	0.17 0.17 0.17 ---	2	2-4
7B--------------- Derroc	0-6 6-28 28-61	5-15 5-15 5-10	1.40-1.65 1.55-1.70 1.55-1.70	2.0-20 2.0-20 >6.0	0.10-0.15 0.06-0.09 0.04-0.07	5.6-7.3 5.6-7.3 5.6-7.3	Low---------- Low---------- Low----------	0.17 0.17 0.17	3	1-3
8E*: Drypond--------- Rock outcrop.	0-2 2-14 14-18 18	10-25 15-30 15-30 ---	1.25-1.40 1.20-1.40 1.20-1.40 ---	6.0-20 6.0-20 6.0-20 ---	0.08-0.10 0.04-0.08 0.03-0.08 ---	3.6-5.0 3.6-5.0 3.6-5.0 ---	Low---------- Low---------- Low---------- ---	0.15 0.10 0.05 ---	1	.5-2
9A--------------- Evansham	0-7 7-22 22-63 63-75	30-45 30-55 35-60 25-60	1.40-1.52 1.36-1.58 1.30-1.44 1.40-1.52	0.06-0.2 0.06-0.2 0.06-0.2 0.06-0.2	0.12-0.18 0.12-0.18 0.12-0.16 0.12-0.18	6.1-7.8 6.1-7.8 6.1-7.8 6.1-7.8	High--------- High--------- Very high---- High---------	0.20 0.20 0.28 0.28	5	3-15
10B, 10C, 10D---- Frederick	0-7 7-72	13-27 40-80	1.25-1.50 1.20-1.50	2.0-6.0 0.6-2.0	0.16-0.24 0.10-0.18	4.5-6.0 4.5-6.0	Low---------- High---------	0.32 0.24	4	1-2

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
11A	0-10	15-27	1.20-1.40	0.6-2.0	0.20-0.26	5.6-7.8	Low	0.32	5	2-4
Gullion	10-42	18-35	1.20-1.40	0.6-2.0	0.17-0.22	5.6-7.8	Low	0.32		
	42-62	18-35	1.20-1.40	0.6-6.0	0.12-0.18	5.6-7.8	Low	0.32		
12C, 12D	0-7	15-35	1.20-1.40	0.6-6.0	0.16-0.24	5.1-6.5	Low	0.32	4	1-5
Hagerstown	7-42	23-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate	0.28		
	42-55	23-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate	0.28		
	55	---	---	---	---	---	---	---		
13E*:										
Hagerstown	0-7	15-35	1.20-1.40	0.6-6.0	0.16-0.24	5.1-6.5	Low	0.32	4	1-5
	7-42	23-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate	0.28		
	42-55	23-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate	0.28		
	55	---	---	---	---	---	---	---		
Rock outcrop.										
14B*, 14C*, 14D*, 14E*:										
Hagerstown	0-7	15-35	1.20-1.40	0.6-6.0	0.16-0.24	5.1-6.5	Low	0.32	4	1-5
	7-42	23-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate	0.28		
	42-55	23-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate	0.28		
	55	---	---	---	---	---	---	---		
Wurno	0-6	10-27	1.20-1.50	0.6-2.0	0.07-0.20	4.5-7.8	Low	0.28	2	1-2
	6-16	20-35	1.30-1.60	0.6-2.0	0.03-0.20	4.5-7.8	Low	0.17		
	16-25	10-27	1.30-1.60	0.6-2.0	0.03-0.14	6.6-7.8	Low	0.17		
	25-32	---	---	---	---	---	---	---		
	32	---	---	---	---	---	---	---		
15B	0-10	15-27	1.20-1.40	0.6-2.0	0.12-0.22	4.5-7.3	Low	0.32	5	1-4
Ingledove	10-45	18-35	1.20-1.50	0.6-2.0	0.13-0.18	4.5-7.3	Low	0.28		
	45-72	10-35	1.20-1.40	0.6-2.0	0.08-0.17	5.6-7.3	Low	0.28		
16C, 16D, 16E	0-3	10-25	1.30-1.50	2.0-6.0	0.10-0.16	4.5-5.5	Low	0.17	4	.5-5
Jefferson	3-30	18-34	1.30-1.65	2.0-6.0	0.10-0.16	4.5-5.5	Low	0.17		
	30-68	15-30	1.30-1.65	2.0-6.0	0.08-0.14	4.5-5.5	Low	0.17		
17C, 17D, 17E	0-4	5-20	1.20-1.40	2.0-6.0	0.09-0.16	3.6-5.5	Low	0.28	2	.5-4
Lily	4-28	18-35	1.25-1.35	2.0-6.0	0.12-0.18	3.6-5.5	Low	0.28		
	28	---	---	---	---	---	---	---		
18B*, 18C*, 18D*:										
Marbie	0-9	15-27	1.25-1.45	0.6-2.0	0.18-0.22	3.6-5.5	Low	0.37	5	.5-2
	9-21	20-35	1.30-1.55	0.6-2.0	0.14-0.20	3.6-5.5	Moderate	0.32		
	21-46	20-35	1.65-1.85	0.06-0.2	0.10-0.14	3.6-5.5	Moderate	0.28		
	46-62	25-55	1.35-1.65	0.2-2.0	0.08-0.10	3.6-5.5	Moderate	0.24		
Wyrick	0-13	15-30	1.40-1.60	0.6-6.0	0.18-0.24	3.6-5.5	Moderate	0.32	5	.5-2
	13-22	20-35	1.50-1.65	0.6-2.0	0.18-0.24	3.6-5.5	Moderate	0.32		
	22-46	20-40	1.50-1.65	0.6-2.0	0.12-0.18	3.6-5.5	Moderate	0.24		
	46-63	30-60	1.35-1.60	0.6-2.0	0.10-0.16	3.6-5.5	Moderate	0.20		
19C, 19D, 19E	0-4	2-10	1.50-1.65	2.0-6.0	0.08-0.12	3.6-5.5	Low	0.15	4	.5-2
Matneflat	4-38	3-18	1.50-1.65	2.0-6.0	0.08-0.10	3.6-5.5	Low	0.15		
	38-62	2-3	1.50-1.70	2.0-6.0	0.06-0.08	3.6-5.5	Low	0.10		
20A	0-12	12-27	1.35-1.60	0.6-2.0	0.18-0.23	5.6-8.4	Low	0.28	5	1-3
Nomberville	12-67	18-35	1.55-1.70	0.6-2.0	0.18-0.23	5.6-8.4	Low	0.32		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
21A----------	0-8	25-40	1.20-1.45	0.6-2.0	0.12-0.18	5.1-7.8	Low----------	0.37	3	.5-2
Pagebrook	8-26	45-60	1.30-1.60	0.06-0.2	0.08-0.14	5.1-7.8	High---------	0.28		
	26-34	40-50	1.30-1.55	0.06-0.6	0.08-0.14	6.1-8.4	High---------	0.28		
	34-63	35-50	1.35-1.55	0.06-0.6	0.08-0.14	6.1-8.4	Moderate-----	0.28		
22*----------	0-60	---	---	---	---	---	----------	----	---	---
Pits, quarries										
23C*, 23D*, 23E*:										
Rayne----------	0-6	10-27	1.20-1.40	0.6-2.0	0.14-0.18	4.5-5.5	Low----------	0.28	3	1-3
	6-47	18-35	1.40-1.60	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.20		
	47-58	10-30	1.40-1.60	0.6-2.0	0.10-0.16	4.5-5.5	Low----------	0.20		
	58	---	---	---	---	---	----------	----		
Berks----------	0-4	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	Low----------	0.17	3	.5-3
	4-19	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low----------	0.17		
	19-27	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.5	Low----------	0.17		
	27	---	---	---	---	---	----------	----		
24F*:										
Rock outcrop.										
Wurno----------	0-6	10-27	1.20-1.50	0.6-2.0	0.07-0.20	4.5-7.8	Low----------	0.28	2	1-2
	6-11	20-35	1.30-1.60	0.6-2.0	0.03-0.20	4.5-7.8	Low----------	0.17		
	11-25	10-27	1.30-1.60	0.6-2.0	0.03-0.14	6.6-7.8	Low----------	0.17		
	25-32	---	---	---	---	---	----------	----		
	32	---	---	---	---	---	----------	----		
25B, 25C, 25D----	0-10	15-27	1.30-1.45	0.6-6.0	0.14-0.22	3.6-6.0	Low----------	0.32	5	.5-2
Shottower	10-19	30-50	1.45-1.60	0.6-2.0	0.10-0.15	3.6-6.0	Moderate-----	0.24		
	19-72	40-70	1.45-1.60	0.6-2.0	0.10-0.14	3.6-6.0	Moderate-----	0.20		
26A----------	0-10	15-27	1.35-1.60	0.6-2.0	0.16-0.22	6.1-8.4	Low----------	0.32	5	1-3
Sindion	10-41	18-35	1.45-1.70	0.6-2.0	0.08-0.18	6.1-8.4	Low----------	0.32		
	41-65	15-35	1.50-1.70	0.6-6.0	0.06-0.14	6.1-8.4	Low----------	0.28		
27A----------	0-18	12-20	1.20-1.40	0.6-6.0	0.12-0.16	6.1-8.4	Low----------	0.17	5	1-3
Speedwell	18-42	18-35	1.30-1.50	0.6-2.0	0.08-0.18	6.1-8.4	Low----------	0.32		
	42-72	8-35	1.20-1.40	6.0-20	0.04-0.12	6.1-8.4	Low----------	0.20		
28C*, 28D*, 28E*:										
Sylvatus--------	0-3	10-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.0	Low----------	0.28	1	.5-2
	3-15	10-35	1.20-1.60	0.6-2.0	0.10-0.14	3.6-5.0	Low----------	0.10		
	15-18	10-30	1.20-1.40	0.6-2.0	0.04-0.10	3.6-5.0	Low----------	0.10		
	18	---	---	---	---	---	----------	----		
Sylco----------	0-7	15-25	1.00-1.20	0.6-2.0	0.11-0.16	4.5-5.5	----------	0.24	2	---
	7-25	15-35	1.30-1.50	0.6-2.0	0.10-0.15	4.5-5.5	Low----------	0.20		
	25-35	15-35	1.20-1.50	0.6-2.0	0.05-0.10	4.5-5.5	Low----------	0.15		
	35	---	---	---	---	---	----------	----		
29B, 30C---------	0-5	6-25	1.30-1.50	2.0-6.0	0.11-0.20	3.6-6.0	Low----------	0.32	5	1-3
Timberville	5-28	13-35	1.30-1.50	0.6-2.0	0.11-0.19	3.6-6.0	Low----------	0.24		
	28-72	35-60	1.40-1.55	0.6-2.0	0.10-0.18	3.6-6.0	Moderate-----	0.24		
31.										
Udorthents										

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
32*:										
Udorthents.										
Urban land.										
33C*:										
Urban land.										
Frederick	0-7	13-27	1.25-1.50	2.0-6.0	0.16-0.24	4.5-6.0	Low	0.32	4	1-2
	7-72	40-80	1.20-1.50	0.6-2.0	0.10-0.18	4.5-6.0	High	0.24		
34C*:										
Urban land.										
Marbie	0-9	15-27	1.25-1.45	0.6-2.0	0.18-0.22	3.6-5.5	Low	0.37	5	.5-2
	9-21	20-35	1.30-1.55	0.6-2.0	0.14-0.20	3.6-5.5	Moderate	0.32		
	21-46	20-35	1.65-1.85	0.06-0.2	0.10-0.14	3.6-5.5	Moderate	0.28		
	46-62	25-55	1.35-1.65	0.2-2.0	0.08-0.10	3.6-5.5	Moderate	0.24		
Timberville	0-5	6-25	1.30-1.50	2.0-6.0	0.11-0.20	3.6-6.0	Low	0.32	5	1-3
	5-28	13-35	1.30-1.50	0.6-2.0	0.11-0.19	3.6-6.0	Low	0.24		
	28-72	35-60	1.40-1.55	0.6-2.0	0.10-0.18	3.6-6.0	Moderate	0.24		
35C*, 35D*, 35E*:										
Weikert	0-6	15-27	1.20-1.40	2.0-6.0	0.08-0.14	4.5-6.0	Low	0.28	2	1-3
	6-12	15-27	1.20-1.40	2.0-6.0	0.04-0.08	3.6-6.0	Low	0.28		
	12	---	---	---	---	---	---	---		
Berks	0-4	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	Low	0.17	3	.5-3
	4-19	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low	0.17		
	19-27	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.5	Low	0.17		
	27	---	---	---	---	---	---	---		
36B	0-9	12-20	1.20-1.40	0.6-6.0	0.12-0.18	5.1-6.0	Low	0.37	4	1-3
Wheeling	9-65	18-30	1.30-1.50	0.6-2.0	0.08-0.16	5.1-6.0	Low	0.32		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in
symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a
data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Ris
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Unco st
					Ft			In			
1B, 1C, 1D---Austinville	B	None	---	---	>6.0	---	---	>60	---	Moderate	High
2E*:											
Austinville	B	None	---	---	>6.0	---	---	>60	---	Moderate	High
Rock outcrop	D	None	---	---	---	---	---	0	Hard	---	-
3B---Botetourt	C	None	---	---	1.5-2.5	Apparent	Nov-May	>60	---	High-----	Mode
4C*, 4D*, 4E*:											
Chiswell	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	Mode
Groseclose	C	None	---	---	>6.0	---	---	>60	---	Moderate	High
Litz	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Mode
5A---Clubcaf	D	Frequent	Brief to long.	Dec-Apr	0-1.5	Apparent	Dec-May	>60	---	High-----	High
6C, 6D, 6E---Dekalb	C	None	---	---	>6.0	---	---	20-40	Hard	Low------	Low-
7B---Derroc	B	Occasional	Very brief to brief.	Dec-Mar	>6.0	---	---	>60	---	Moderate	Low-
8E*:											
Drypond	D	None	---	---	>6.0	---	---	10-20	Hard	Low------	-
Rock outcrop	D	None	---	---	---	---	---	0	Hard	---	-
9A---Evansham	D	Frequent	Long------	Oct-Apr	0-0.5	Apparent	Oct-Apr	>60	---	High-----	Mode
10B, 10C, 10D---Frederick	B	None	---	---	>6.0	---	---	>60	---	Moderate	Mode

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Ris
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoat
					Ft			In			
11A---------- Gullion	C	Occasional	Brief-----	Dec-Apr	1.5-3.0	Apparent	Dec-Apr	>60	---	High-----	Mode
12C, 12D-------- Hagerstown	C	None--------	---	---	>6.0	---	---	>60	Hard	Moderate	Mode
13E*:											
Hagerstown-----	C	None--------	---	---	>6.0	---	---	>60	Hard	Moderate	Mode
Rock outcrop---	D	None--------	---	---	---	---	---	0	Hard	---	-
14B*, 14C*, 14D*, 14E*:											
Hagerstown----	C	None--------	---	---	>6.0	---	---	>60	Hard	Moderate	Mode
Wurno---------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Low-
15B---------- Ingledove	B	None--------	---	---	>6.0	---	---	>60	---	---	Low-
16C, 16D, 16E--- Jefferson	B	None--------	---	---	>6.0	---	---	>60	---	---	Mode
17C, 17D, 17E--- Lily	B	None--------	---	---	>6.0	---	---	20-40	Hard	---	Mode
18B*, 18C*, 18D*:											
Marbie--------	C	None--------	---	---	2.0-4.0	Perched	Nov-Mar	>60	---	High-----	Mode
Wyrick--------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Mode
19C, 19D, 19E--- Matneflat	B	None--------	---	---	>6.0	---	---	>60	---	Low------	Low-
20A---------- Nomberville	B	Occasional	Very brief to brief.	Dec-Mar	>6.0	---	---	>60	---	High-----	Low-
21A---------- Pagebrook	D	Rare--------	---	---	2.0-4.0	Apparent	Dec-Mar	>60	---	Moderate	High
22*---------- Pits, quarries	---	None--------	---	---	>6.0	---	---	>60	---	---	-

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Ris
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Unco st
					Ft			In			
23C*, 23D*, 23E*:											
Rayne	B	None	---	---	>6.0	---	---	>40	Soft	Moderate	Low-
Berks	C	None	---	---	>6.0	---	---	20-40	Soft	Low	Low-
24F*:											
Rock outcrop	D	None	---	---	---	---	---	0	Hard	---	-
Wurno	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Low-
25B, 25C, 25D---Shottower	B	None	---	---	>6.0	---	---	>60	---	Moderate	High
26A---Sindion	B	Occasional	Very brief to brief.	Dec-Mar	1.5-3.0	Apparent	Dec-Apr	>60	---	High	Low-
27A---Speedwell	B	Occasional	Very brief to brief.	Jan-Apr	>6.0	---	---	>60	---	Moderate	Low-
28C*, 28D*, 28E*:											
Sylvatus	D	None	---	---	>6.0	---	---	10-20	Hard	Moderate	Mode
Sylco	C	None	---	---	>6.0	---	---	20-40	Hard	---	Low-
29B---Timberville	B	Occasional	Very brief	Apr-Oct	>6.0	---	---	>60	---	Moderate	Low-
30C---Timberville	B	Rare	---	---	>6.0	---	---	>60	---	Moderate	Low-
31. Udorthents											
32*: Udorthents.											
Urban land	---	None	---	---	>2.0	---	---	>10	---	---	-
33C*: Urban land	---	None	---	---	>2.0	---	---	>10	---	---	-

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoat
					Ft			In			
33C*:											
Frederick	C	None	---	---	>6.0	---	---	>60	---	Moderate	Moder
34C*:											
Urban land	---	None	---	---	>2.0	---	---	>10	---	---	-
Marbie	C	None	---	---	2.0-4.0	Perched	Nov-Mar	>60	---	High	Moder
Timberville	B	Rare	---	---	>6.0	---	---	>60	---	Moderate	Low-
35C*, 35D*, 35E*:											
Weikert	C/D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	Moder
Berks	C	None	---	---	>6.0	---	---	20-40	Soft	Low	Low-
36B--Wheeling	B	None	---	---	>6.0	---	---	>60	---	Moderate	Low-

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Austinville	Clayey, mixed, mesic Rhodic Paleudults
Berks	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Botetourt	Fine-loamy, siliceous, mesic Ultic Hapludalfs
Chiswell	Loamy-skeletal, mixed, mesic, shallow Typic Dystrochrepts
Clubcaf	Fine-silty, mixed, mesic Cumulic Haplaquolls
Dekalb	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Derroc	Loamy-skeletal, siliceous, mesic Dystric Fluventic Eutrochrepts
Drypond	Loamy-skeletal, siliceous, mesic Lithic Dystrochrepts
Evansham	Fine, mixed, mesic Typic Pelluderts
Frederick	Clayey, mixed, mesic Typic Paleudults
Groseclose	Clayey, mixed, mesic Typic Hapludults
Gullion	Fine-silty, siliceous, mesic Fluventic Hapludolls
Hagerstown	Fine, mixed, mesic Typic Hapludalfs
Ingledove	Fine-loamy, siliceous, mesic Ultic Hapludalfs
Jefferson	Fine-loamy, siliceous, mesic Typic Hapludults
Lily	Fine-loamy, siliceous, mesic Typic Hapludults
Litz	Loamy-skeletal, mixed, mesic Ruptic-Ultic Dystrochrepts
Marbie	Fine-loamy, siliceous, mesic Typic Fragiudults
Matneflat	Coarse-loamy, siliceous, mesic Typic Paleudults
Nomberville	Fine-silty, siliceous, mesic Fluventic Hapludolls
Pagebrook	Fine, montmorillonitic, mesic Vertic Eutrochrepts
Rayne	Fine-loamy, mixed, mesic Typic Hapludults
Shottower	Clayey, kaolinitic, mesic Typic Paleudults
Sindion	Fine-loamy, mixed, mesic Fluventic Hapludolls
Speedwell	Fine-loamy, mixed, mesic Fluventic Hapludolls
Sylco	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Sylvatus	Loamy-skeletal, mixed, mesic Lithic Dystrochrepts
Timberville	Clayey, mixed, mesic Typic Hapludults
Udorthents	Udorthents
Weikert	Loamy-skeletal, mixed, mesic Lithic Dystrochrepts
Wheeling	Fine-loamy, mixed, mesic Ultic Hapludalfs
Wurno	Loamy-skeletal, mixed, mesic Dystric Eutrochrepts
Wyrick	Fine-loamy, siliceous, mesic Typic Paleudults

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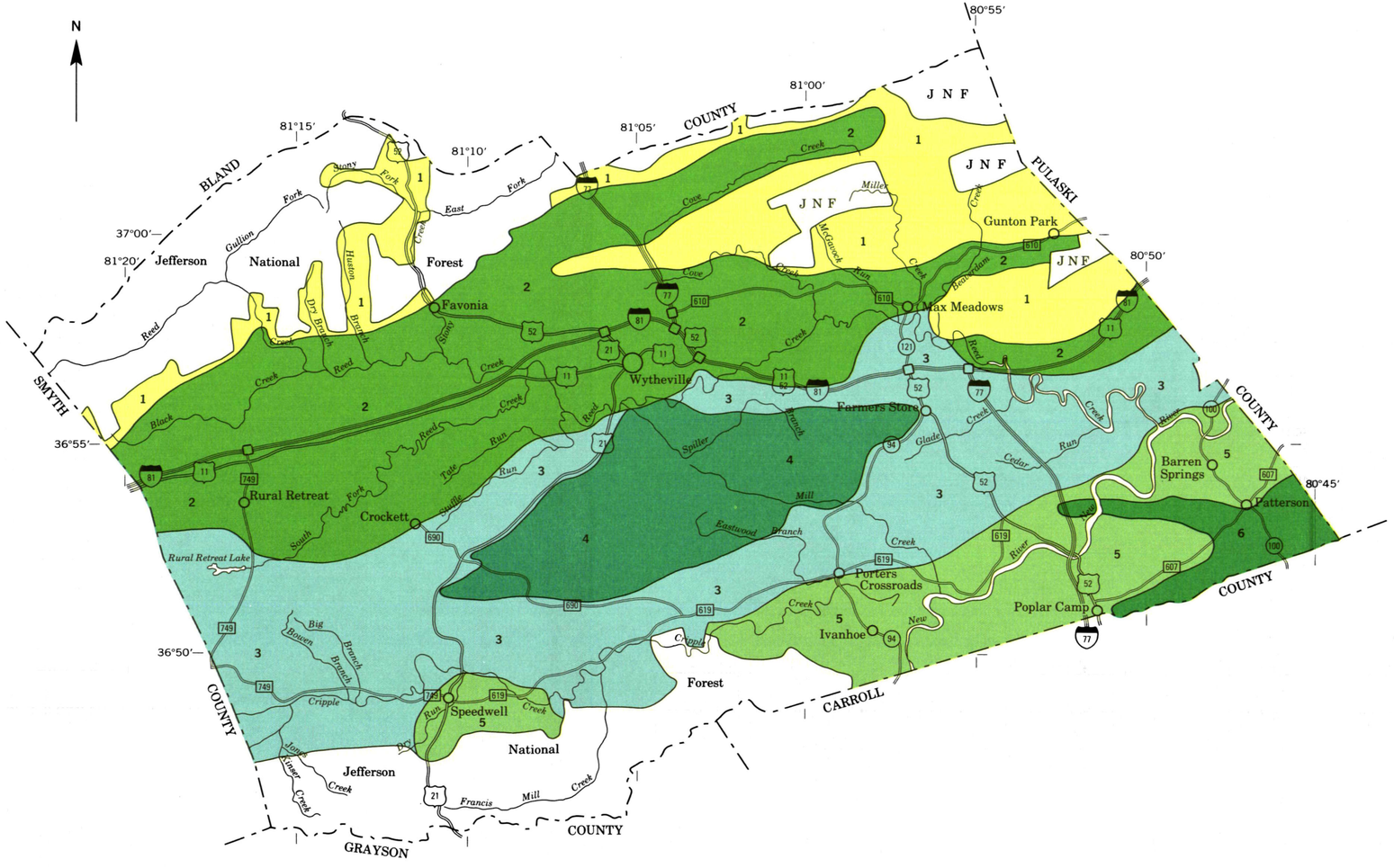


SOIL LEGEND

1 — JEFFERSON-WEIKERT-BERKS: Very deep, shallow, and moderately deep, sloping to very steep soils that have a loamy subsoil and a high content of rock fragments; formed in colluvium derived from sandstone and shale or residuum of shale interbedded with siltstone and sandstone

2 — FREDERICK-HAGERSTOWN: Very deep and deep, nearly level to steep soils that have a clayey subsoil; formed in residuum of limestone interbedded with shale, siltstone, and sandstone

3 — CHISWELL-GROSECLOSE-LITZ: Shallow, very deep, and moderately deep, sloping to very steep soils that have a loamy subsoil with a high content of rock fragments or have a clayey subsoil; formed in material weathered from a heterogeneous mixture of shale, siltstone, limestone, and sandstone

4 — MATNEFLAT: Very deep, sloping to very steep soils that have a loamy subsoil; formed in colluvium derived from sandstone, quartzite, and shale

5 — SHOTTOWER-AUSTINVILLE-FREDERICK: Very deep, gently sloping to steep soils that have a clayey subsoil; formed in alluvium derived from limestone, shale, siltstone, sandstone, quartzite, and crystalline rocks and in residuum of dolomitic limestone and limestone interbedded with shale, siltstone, and sandstone

6 — SYLVATUS-JEFFERSON-SYLCO: Shallow to very deep, sloping to very steep soils that have a loamy subsoil and a high content of rock fragments; formed in residuum and colluvium derived from phyllite, slate, shale, siltstone, quartzite, and fine grained sandstone

Compiled 1991

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

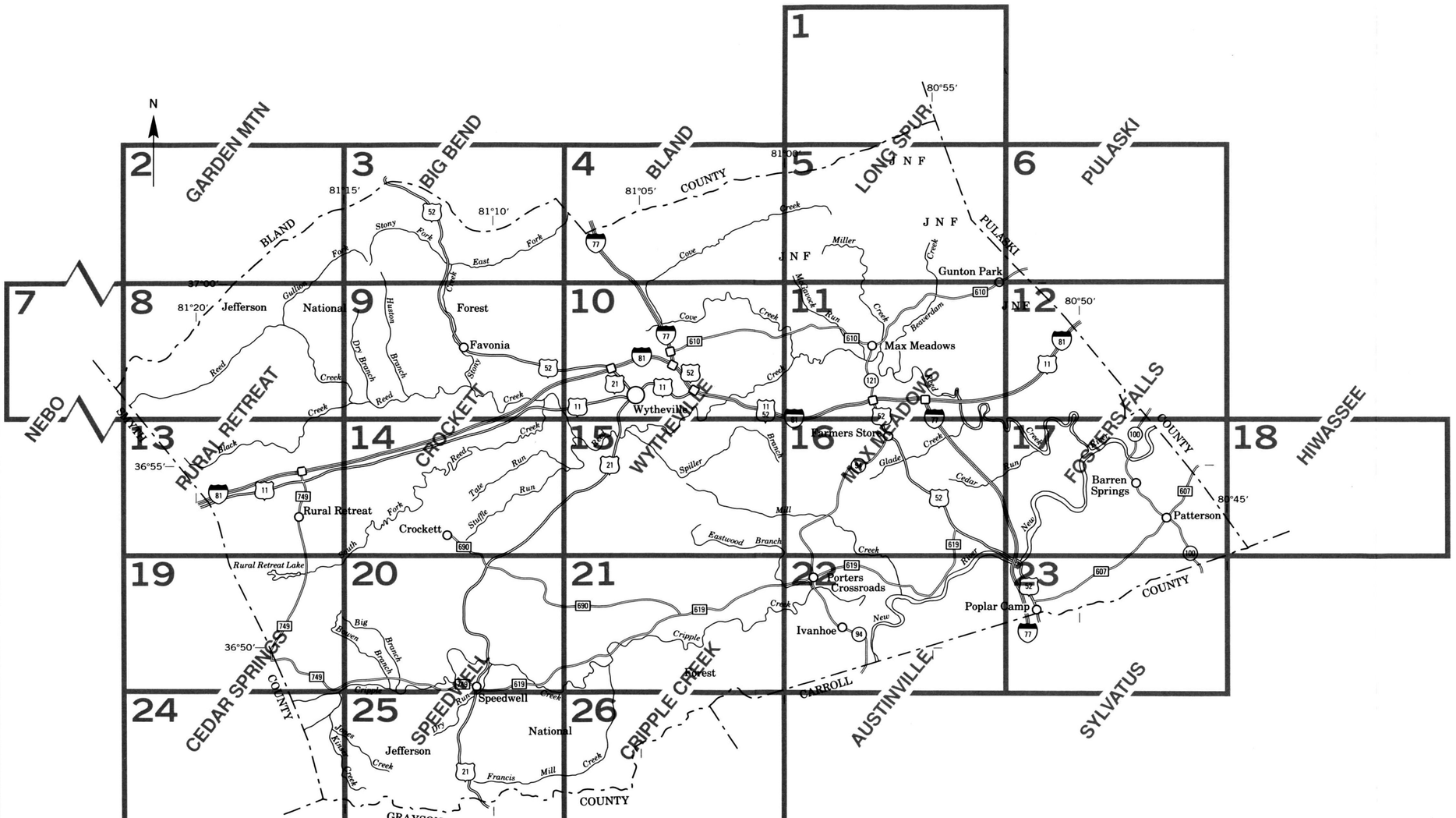
GENERAL SOIL MAP

WYTHE COUNTY, VIRGINIA

Scale 1:190,080

1 0 1 2 3 Mi

1 0 3 6 Km



INDEX TO MAP SHEETS

WYTHE COUNTY, VIRGINIA

Scale 1:190,080

1 0 1 2 3 Mi

1 0 3 6 Km

SOIL LEGEND

Map symbols consist of number and letter combinations. The numbers represent the soil series and textural phase. A capital letter following the number indicates the slope class.

SYMBOL	NAME
1B	Austinville silty clay loam, 2 to 7 percent slopes
1C	Austinville silty clay loam, 7 to 15 percent slopes
1D	Austinville silty clay loam, 15 to 30 percent slopes
2E	Austinville-Rock outcrop complex, 10 to 45 percent slopes
3B	Botetourt silt loam, 2 to 7 percent slopes
4C	Chiswell-Groseclose-Litz complex, 7 to 15 percent slopes
4D	Chiswell-Groseclose-Litz complex, 15 to 30 percent slopes
4E	Chiswell-Groseclose-Litz complex, 30 to 60 percent slopes
5A	Clubcaf silt loam, 0 to 3 percent slopes, frequently flooded
6C	Dekalb channery sandy loam, 7 to 15 percent slopes
6D	Dekalb channery sandy loam, 15 to 35 percent slopes
6E	Dekalb channery sandy loam, 35 to 65 percent slopes
7B	Derroc cobbly sandy loam, 0 to 5 percent slopes, occasionally flooded
8E	Drypond-Rock outcrop complex, 10 to 65 percent slopes
9A	Evansham silty clay loam, 0 to 2 percent slopes, frequently flooded
10B	Frederick silt loam, 2 to 7 percent slopes
10C	Frederick silt loam, 7 to 15 percent slopes
10D	Frederick silt loam, 15 to 30 percent slopes
11A	Gullion loam, 0 to 3 percent slopes, occasionally flooded
12C	Hagerstown silt loam, 7 to 15 percent slopes, very rocky
12D	Hagerstown silt loam, 15 to 30 percent slopes, very rocky
13E	Hagerstown-Rock outcrop complex, 10 to 45 percent slopes
14B	Hagerstown-Wurno complex, 2 to 7 percent slopes
14C	Hagerstown-Wurno complex, 7 to 15 percent slopes
14D	Hagerstown-Wurno complex, 15 to 30 percent slopes
14E	Hagerstown-Wurno complex, 30 to 45 percent slopes
15B	Ingledove loam, 2 to 7 percent slopes
16C	Jefferson cobbly loam, 7 to 15 percent slopes
16D	Jefferson cobbly loam, 15 to 35 percent slopes
16E	Jefferson cobbly loam, 35 to 60 percent slopes
17C	Lily sandy loam, 7 to 15 percent slopes
17D	Lily sandy loam, 15 to 35 percent slopes
17E	Lily sandy loam, 35 to 65 percent slopes
18B	Marbie-Wyrick complex, 2 to 7 percent slopes
18C	Marbie-Wyrick complex, 7 to 15 percent slopes
18D	Marbie-Wyrick complex, 15 to 25 percent slopes
19C	Matneflat gravelly sandy loam, 7 to 15 percent slopes
19D	Matneflat gravelly sandy loam, 15 to 35 percent slopes, stony
19E	Matneflat gravelly sandy loam, 35 to 65 percent slopes, stony
20A	Nomberville silt loam, 0 to 3 percent slopes, occasionally flooded
21A	Pagebrook silt loam, 0 to 3 percent slopes, rarely flooded
22	Pits, quarries
23C	Rayne-Berks complex, 7 to 15 percent slopes
23D	Rayne-Berks complex, 15 to 35 percent slopes
23E	Rayne-Berks complex, 35 to 60 percent slopes
24F	Rock outcrop-Wurno complex, 35 to 75 percent slopes
25B	Shottower loam, 2 to 7 percent slopes
25C	Shottower loam, 7 to 15 percent slopes
25D	Shottower loam, 15 to 30 percent slopes
26A	Sindion loam, 0 to 3 percent slopes, occasionally flooded
27A	Speedwell sandy loam, 0 to 3 percent slopes, occasionally flooded
28C	Sylvatus-Sylco complex, 7 to 15 percent slopes
28D	Sylvatus-Sylco complex, 15 to 35 percent slopes
28E	Sylvatus-Sylco complex, 35 to 65 percent slopes
29B	Timberville silt loam, 0 to 7 percent slopes, occasionally flooded
30C	Timberville silt loam, 7 to 15 percent slopes, rarely flooded
31	Udorthents, nearly level
32	Udorthents-Urban land complex, nearly level to very steep
33C	Urban land-Frederick complex, 0 to 25 percent slopes
34C	Urban land-Marbie-Timberville complex, 0 to 15 percent slopes
35C	Weikert-Berks complex, 7 to 15 percent slopes
35D	Weikert-Berks complex, 15 to 35 percent slopes
35E	Weikert-Berks complex, 35 to 65 percent slopes
36B	Wheeling loam, 2 to 7 percent slopes
W	Water

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool (Davis Airstrip; FLOOD POOL LINE)

STATE COORDINATE TICK

LAND DIVISION CORNER (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate (173)
- Federal (173)
- State (28)
- County, farm or ranch (1283)

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or Small (water)

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban area)
- Church
- School
- Indian mound (label) (Indian Mound)
- Located object (label) (Tower)
- Tank (label) (Gas)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) (CANAL)
- Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial (water; w)
- Intermittent (int; i)

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

- SOIL DELINEATIONS AND SYMBOLS (1B; 35E)
- ESCARPMENTS
  - Bedrock (points down slope)
  - Other than bedrock (points down slope)
- SHORT STEEP SLOPE
- GULLY
- DEPRESSION OR SINK
- SOIL SAMPLE (normally not shown)
- MISCELLANEOUS
  - Blowout
  - Clay spot
  - Gravelly spot
  - Gumbo, slick or scabby spot (sodic)
  - Dumps and other similar non soil areas
  - Prominent hill or peak
  - Rock outcrop (includes sandstone and shale)
  - Saline spot
  - Sandy spot
  - Severely eroded spot
  - Slide or slip (tips point upslope)
  - Stony spot, very stony spot
  - Karst topography

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF
WYTHE COUNTY, VIRGINIA
SHEET NUMBER 1

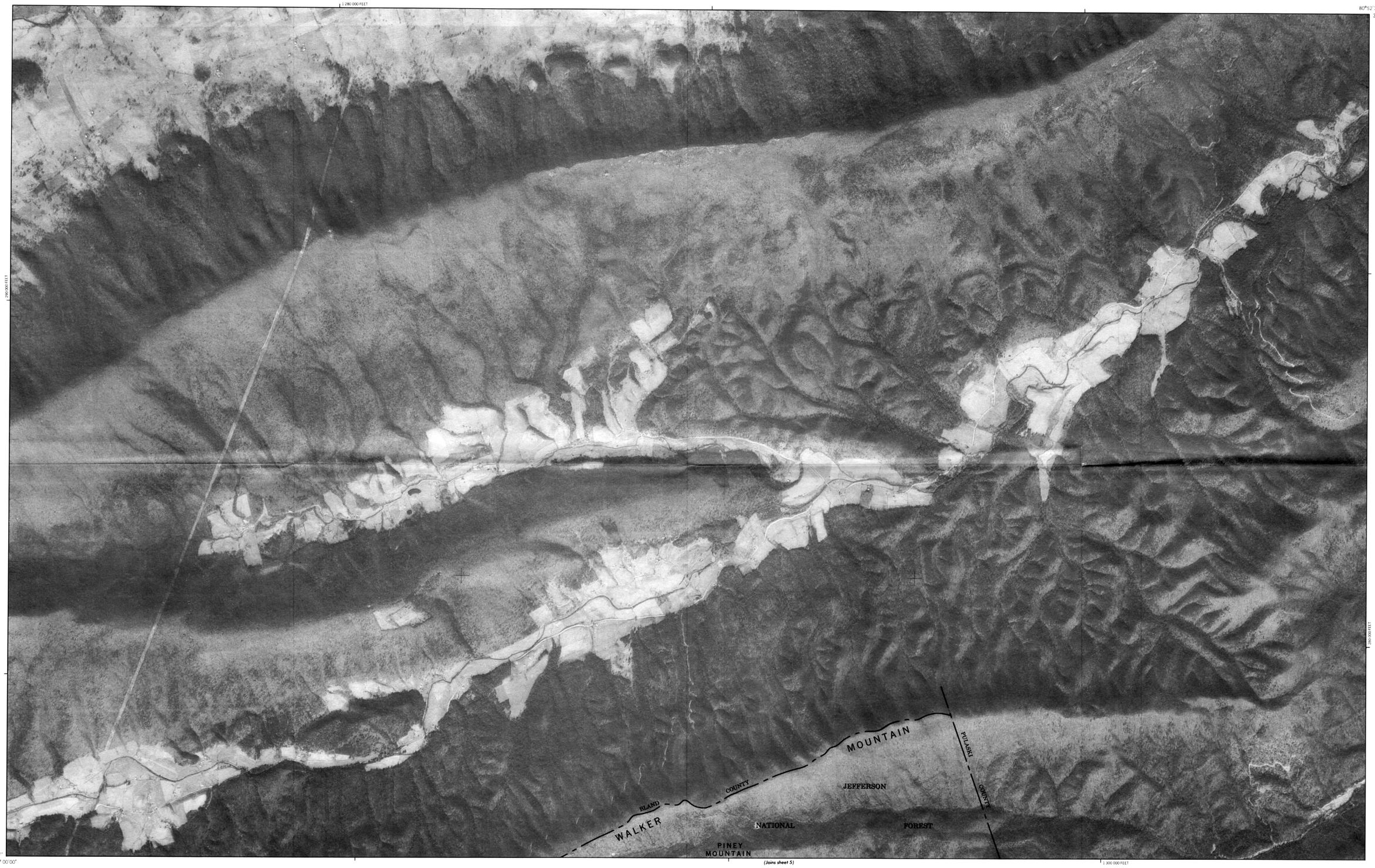
1

N

1 280 000 FEET

280 000 FEET

80°52'30"
37°7'30"



37°03'45"
81°00'00"

(Joins sheet 5)

1 300 000 FEET

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

WYTHE COUNTY, VIRGINIA NO. 1

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

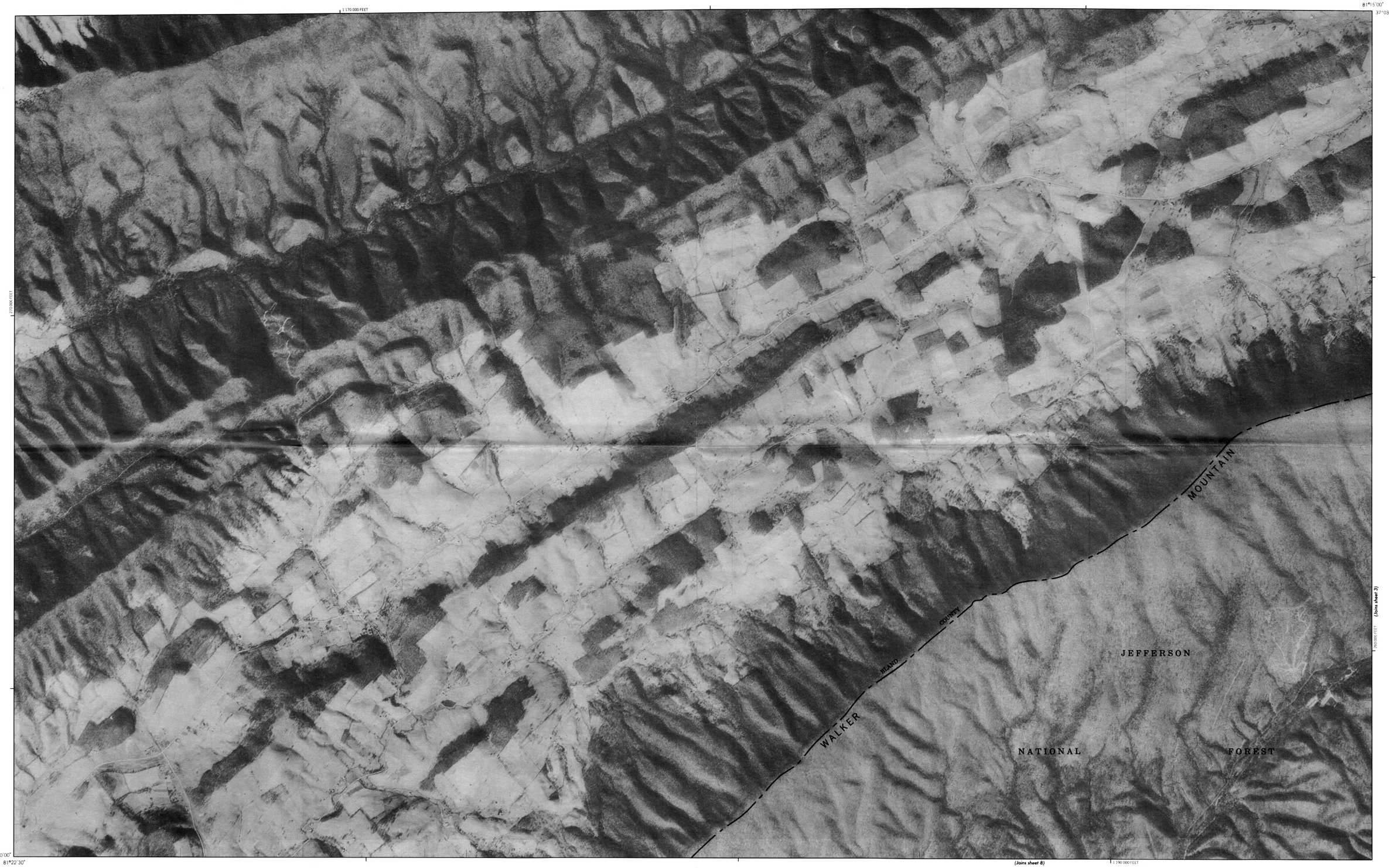
SOIL SURVEY OF
WYTHE COUNTY, VIRGINIA
SHEET NUMBER 2

2
N

1 170 000 FEET

81°15'00"
37°03'45"

1 200 000 FEET



1 200 000 FEET (Joins sheet 3)

37°00'00"
81°22'30"

(Joins sheet 8)

1 190 000 FEET

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological-Survey from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

WYTHE COUNTY, VIRGINIA NO. 2

3
N

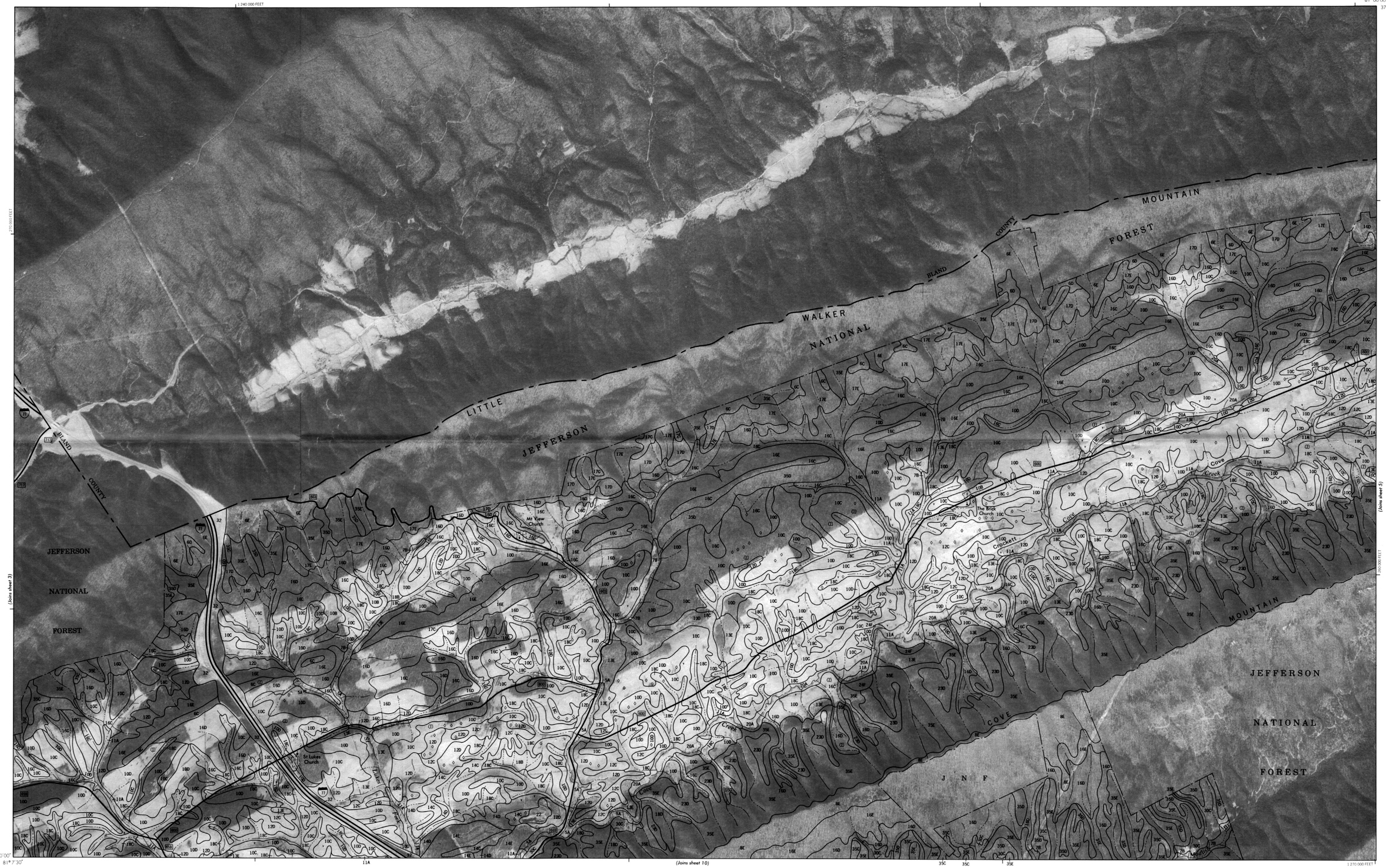
1 200 000 FEET
81°7'30"
37°03'45"
270 000 FEET
(Joins sheet 2)
37°00'00"
81°15'00"
(Joins sheet 9)
(Joins sheet 4)
265 000 FEET
1 230 000 FEET

BLAND COUNTY
WALKER MOUNTAIN
JEFFERSON NATIONAL FOREST
Original Stony Fork Church
Stony Fork
Stony Fork Cabins
Griffith Knob
Little Walker Mountain
52
77
606

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological-Survey from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

WYTHE COUNTY, VIRGINIA NO. 3



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

WYTHE COUNTY, VIRGINIA NO. 4

5
N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

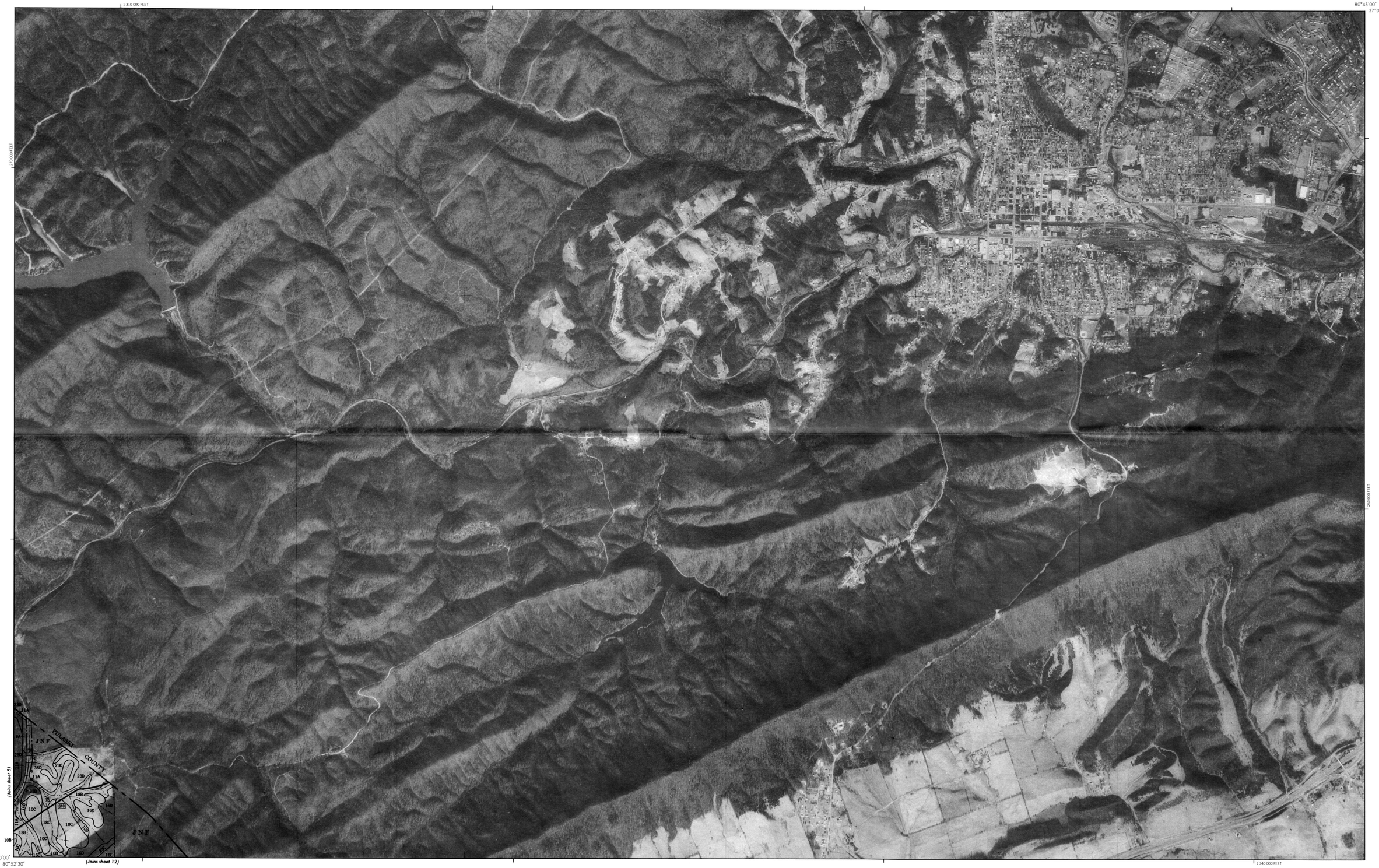
1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

WYTHE COUNTY, VIRGINIA NO. 5

1 310 000 FEET

80°45'00"
37°03'45"

270 000 FEET



260 000 FEET

1 340 000 FEET

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

WYTHE COUNTY, VIRGINIA NO. 6

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF
WYTHE COUNTY, VIRGINIA
SHEET NUMBER 7

7
N

1 130 000 FEET

81°22'30"
37°00'00"

250 000 FEET

1 150 000 FEET

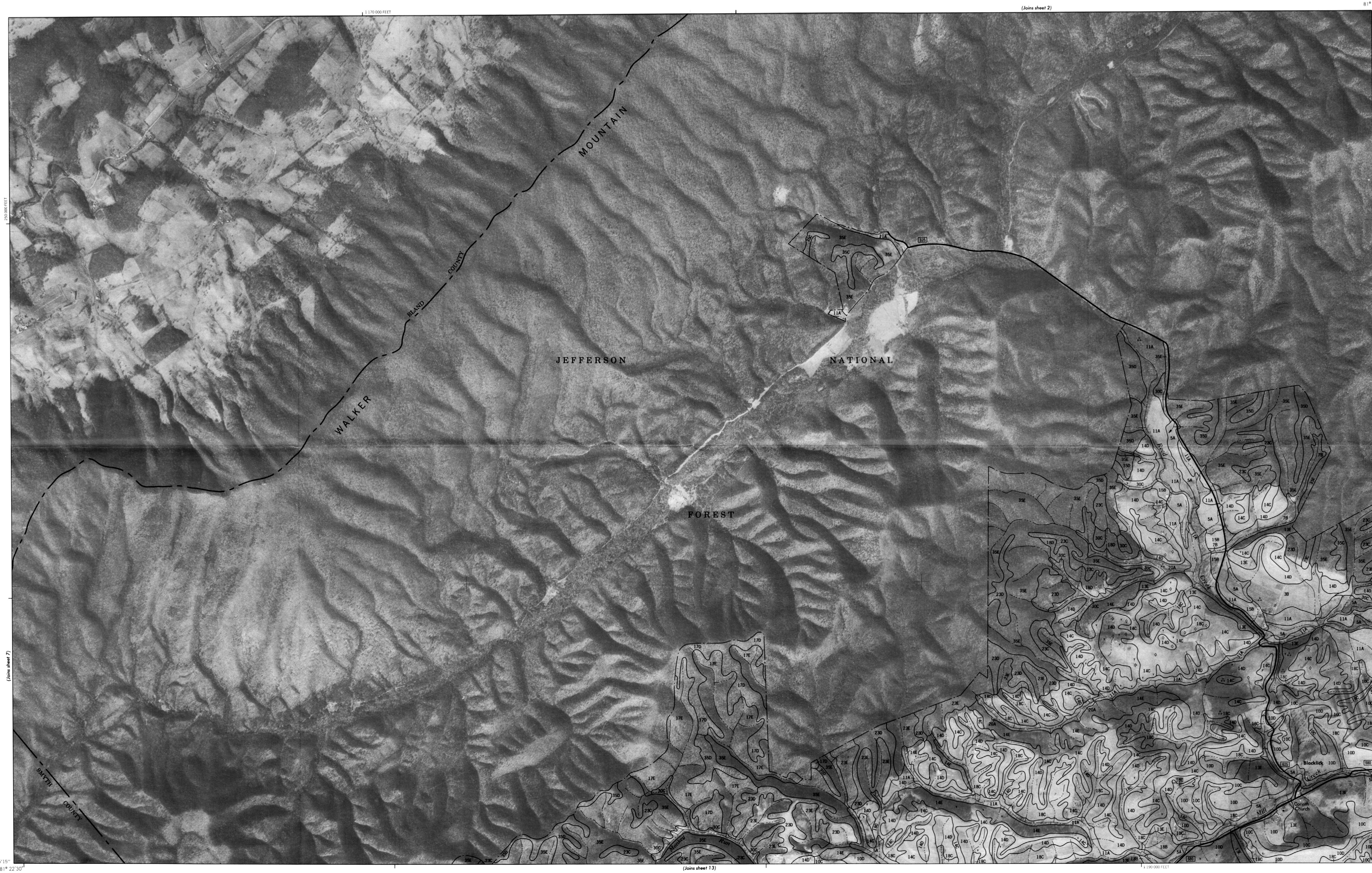
36°56'15"
81°30'00"

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

WYTHE COUNTY, VIRGINIA NO. 7

8
N



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF
WYTHE COUNTY, VIRGINIA
SHEET NUMBER 9

9
N

1 200 000 FEET
(Joins sheet 3)
81°07'30"
37°00'00"
250 000 FEET
(Joins sheet 8)
(Joins sheet 10)
1 230 000 FEET
(Joins sheet 14)
36°56'15"
81°15'00"

JEFFERSON NATIONAL FOREST

Fairview
Keglevs
Favonia
McMitchell Church
Holy Advent Church
Mt Pleasant Church
Sutherland
Marvin Church
Petunia

Hutson Branch
Gripin Branch
Stony Run
Reed Creek
Rush Creek
Pine Ridge

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

WYTHE COUNTY, VIRGINIA NO. 9

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF
WYTHE COUNTY, VIRGINIA
SHEET NUMBER 10

10

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

WYTHE COUNTY, VIRGINIA NO. 10

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF
WYTHE COUNTY, VIRGINIA
SHEET NUMBER 11

11

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

13
N

1 160 000 FEET

(Joins sheet 8)

81°15'00"
36°56'15"

JEFFERSON NATIONAL FOREST

SMYTH COUNTY

Tickle Hollow
Pink Hollow
Brown Hollow
Huddle Branch
Dutton Hollow
Montvale Rd
Mill Creek
PINE RIDGE

Blacklick Church
Kimberlin Church
Shiley Crossroads
Old Mt Airy
Rural Retreat
Summit
High Point Church
Murphysville
Mt Olive Church
Murphysville Cem
Mountain View Cem
Kinder Valley
Russell Memorial Gardens Cemetery

(Joins sheet 14)

1 190 000 FEET

36° 52'30"
81°22'30"

(Joins sheet 19)

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF
WYTHE COUNTY, VIRGINIA
SHEET NUMBER 14

14

N

81°07'30"
36°56'15"

(Joins sheet 9)

(Joins sheet 13)

(Joins sheet 15)

(Joins sheet 20)

36°52'30"
81°15'00"

1 200 000 FEET

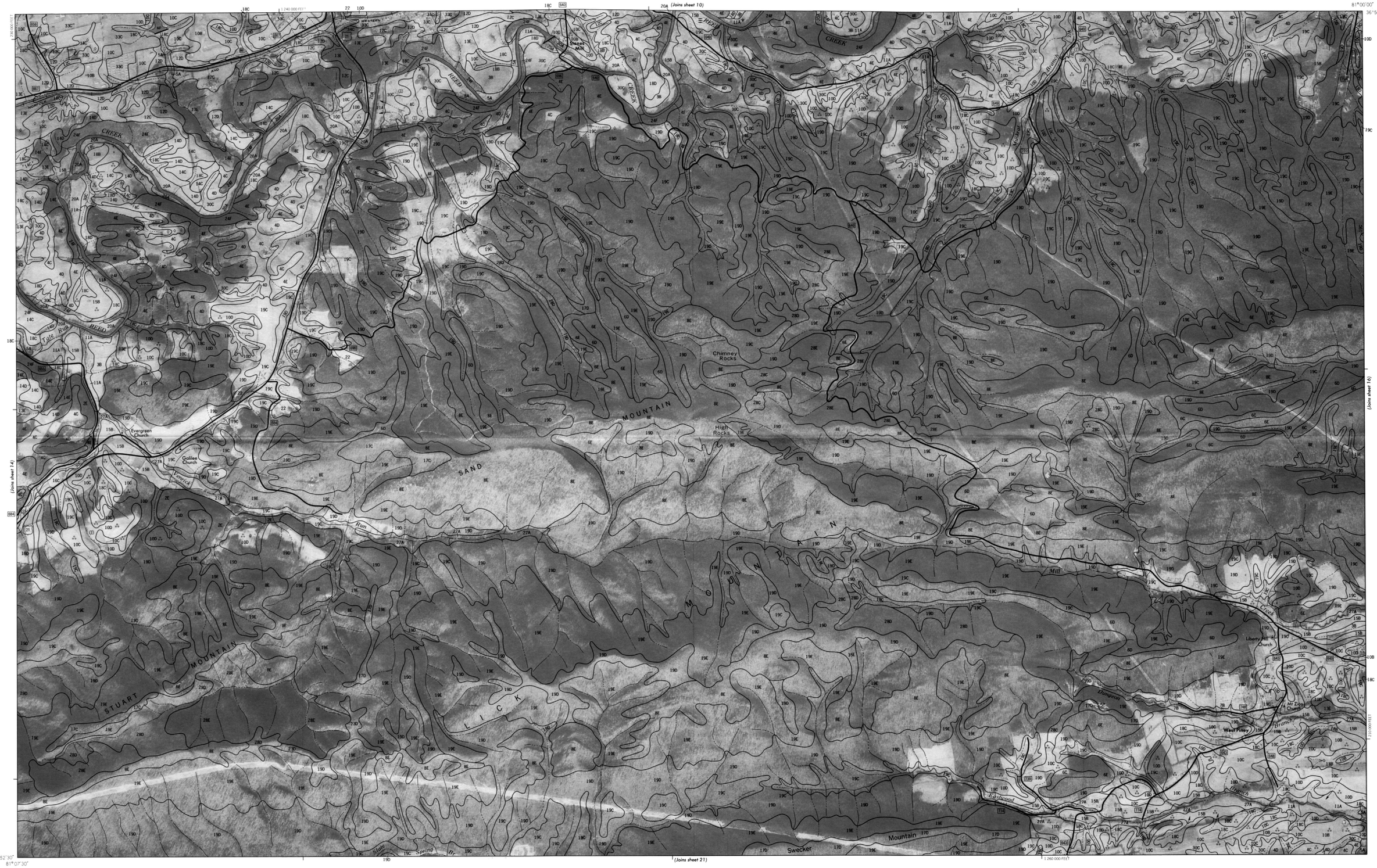
1 230 000 FEET

Wilson
Blessing
Ridge
Pine
Run
Fork
South
New Bethel Church
Cline
Ledbetter Ch
Government Siding
Grubb
Berea Church
Shuffle
St Pauls
Groseclose
Copenhaver
Crockett
Mt Ephraim Ch
LICK MOUNTAIN

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

15
N



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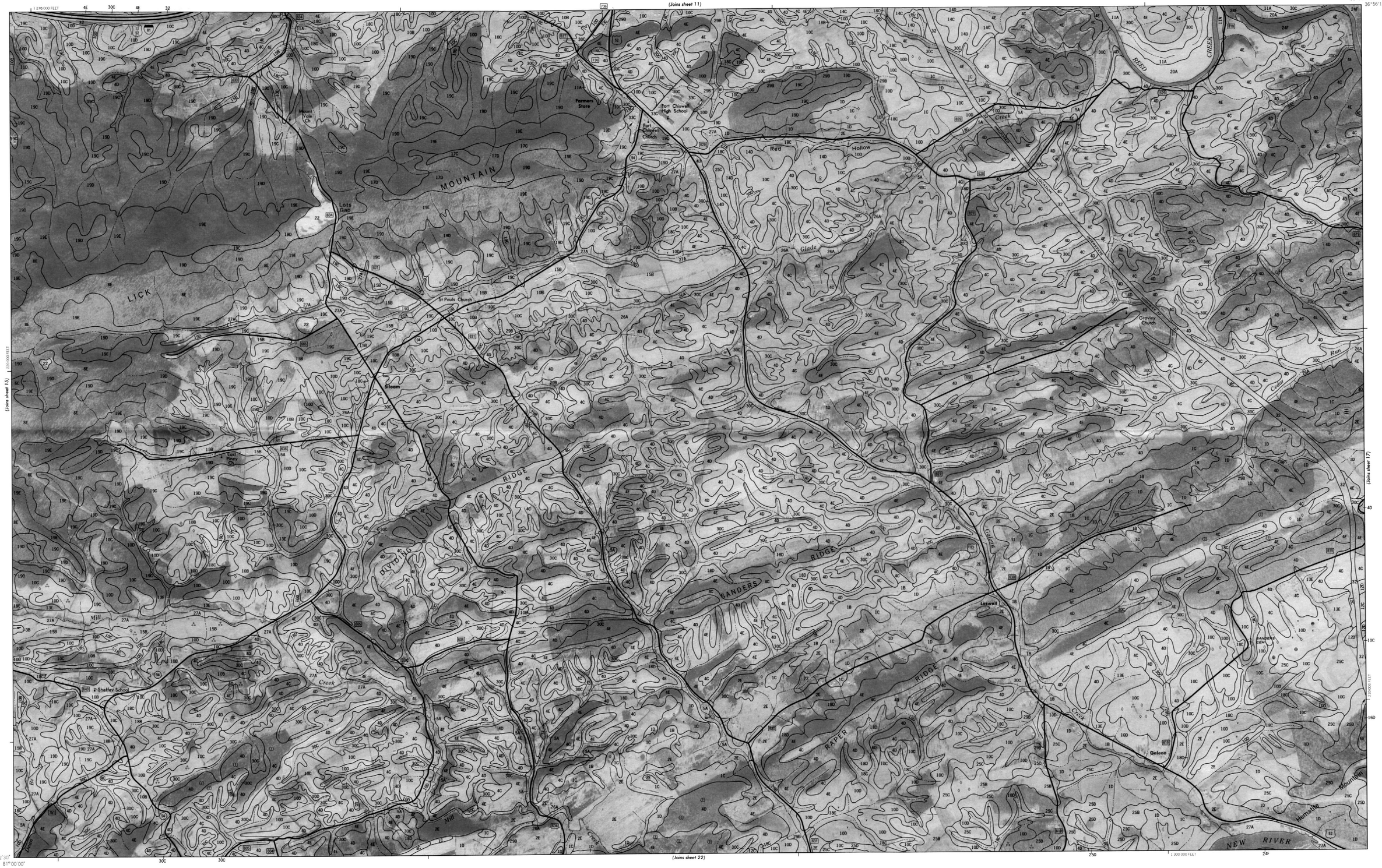
1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF
WYTHE COUNTY, VIRGINIA
SHEET NUMBER 16

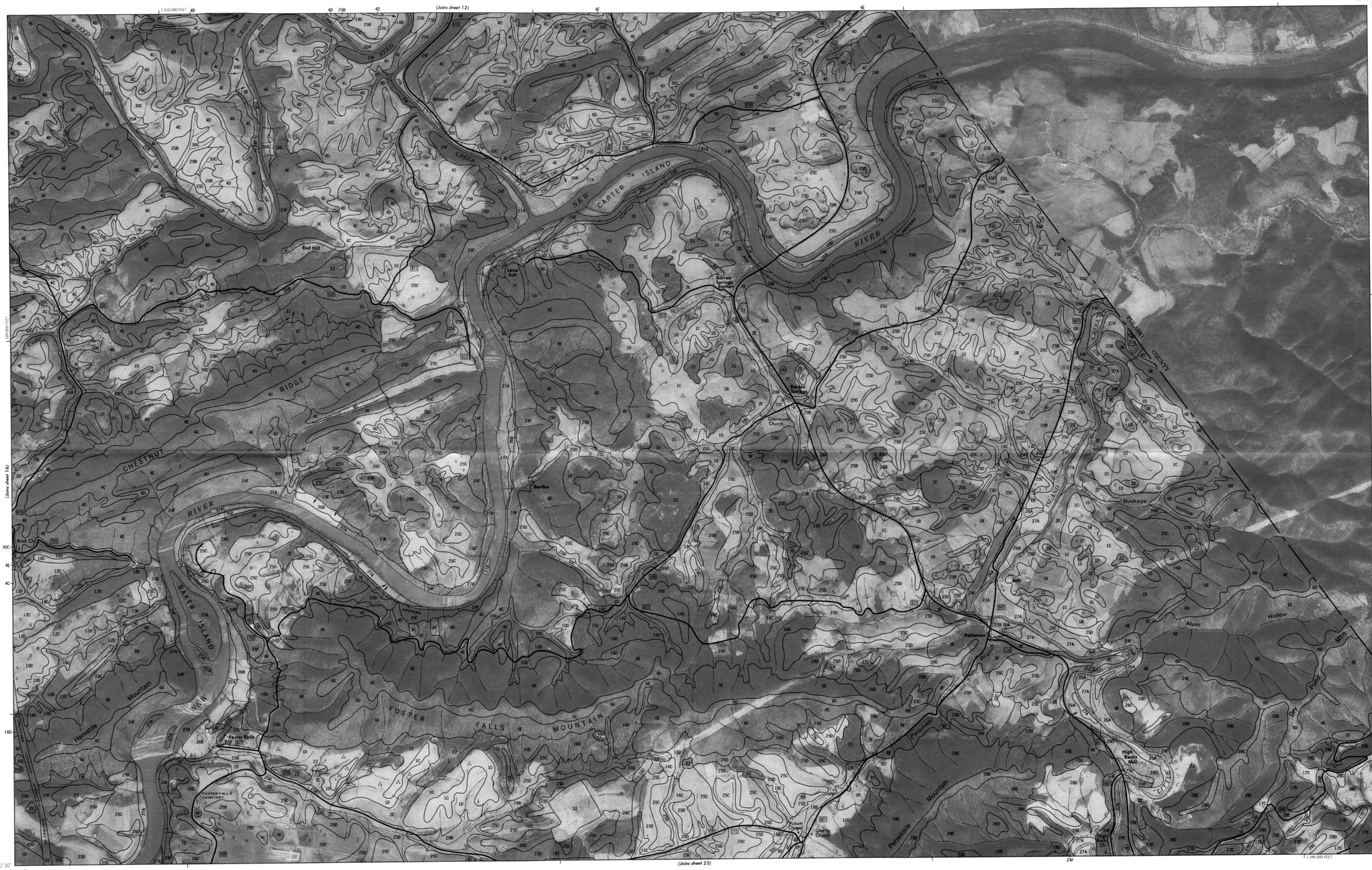
16
N



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

WYTHE COUNTY, VIRGINIA NO. 16



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

WYTHE COUNTY, VIRGINIA NO. 17

1 350 000 FEET

80° 37' 30"

1 370 000 FEET

36° 52' 30"
80° 45' 00"

1 370 000 FEET

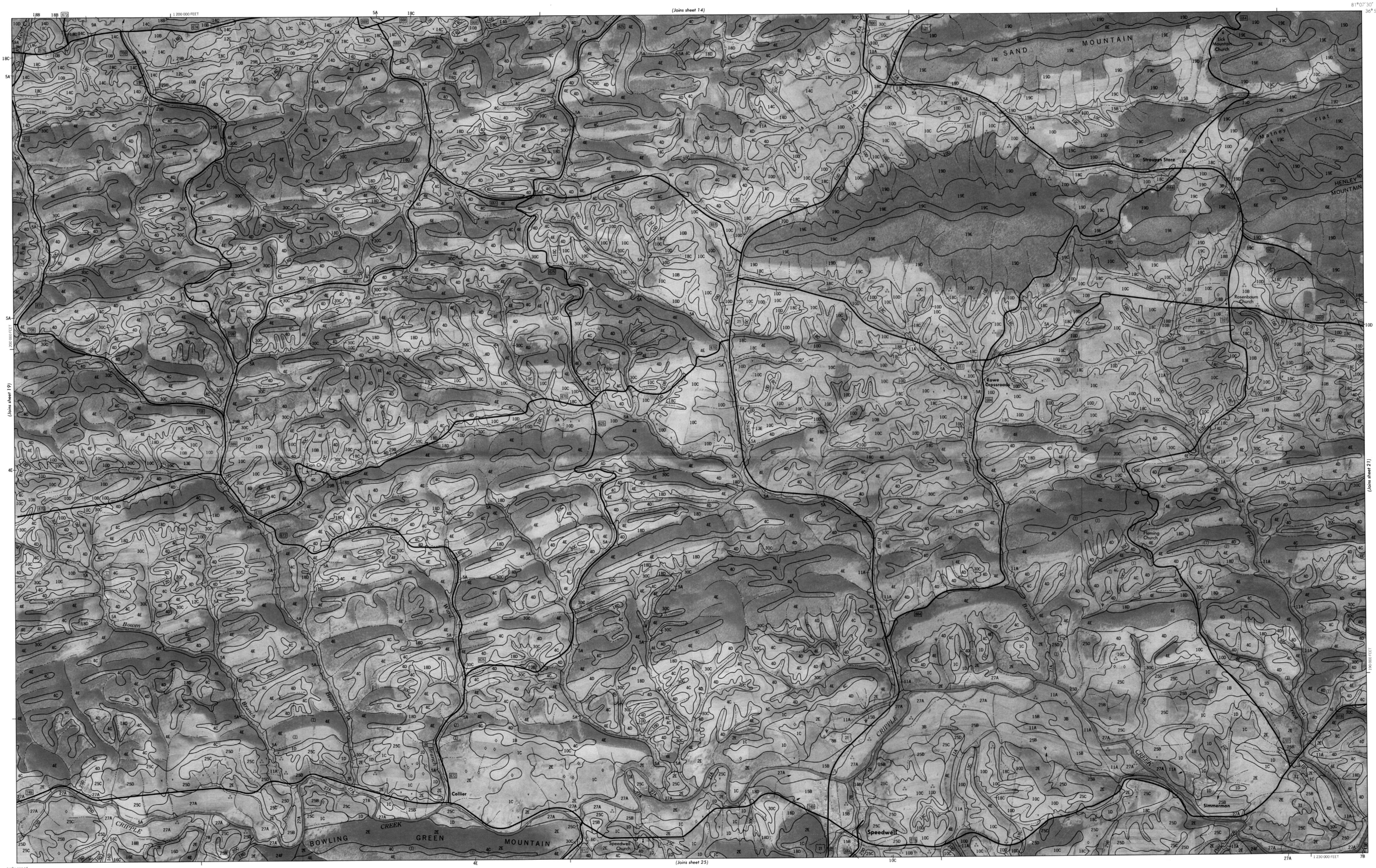
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

WYTHE COUNTY, VIRGINIA NO. 18

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

WYTHE COUNTY, VIRGINIA NO. 20

21
N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

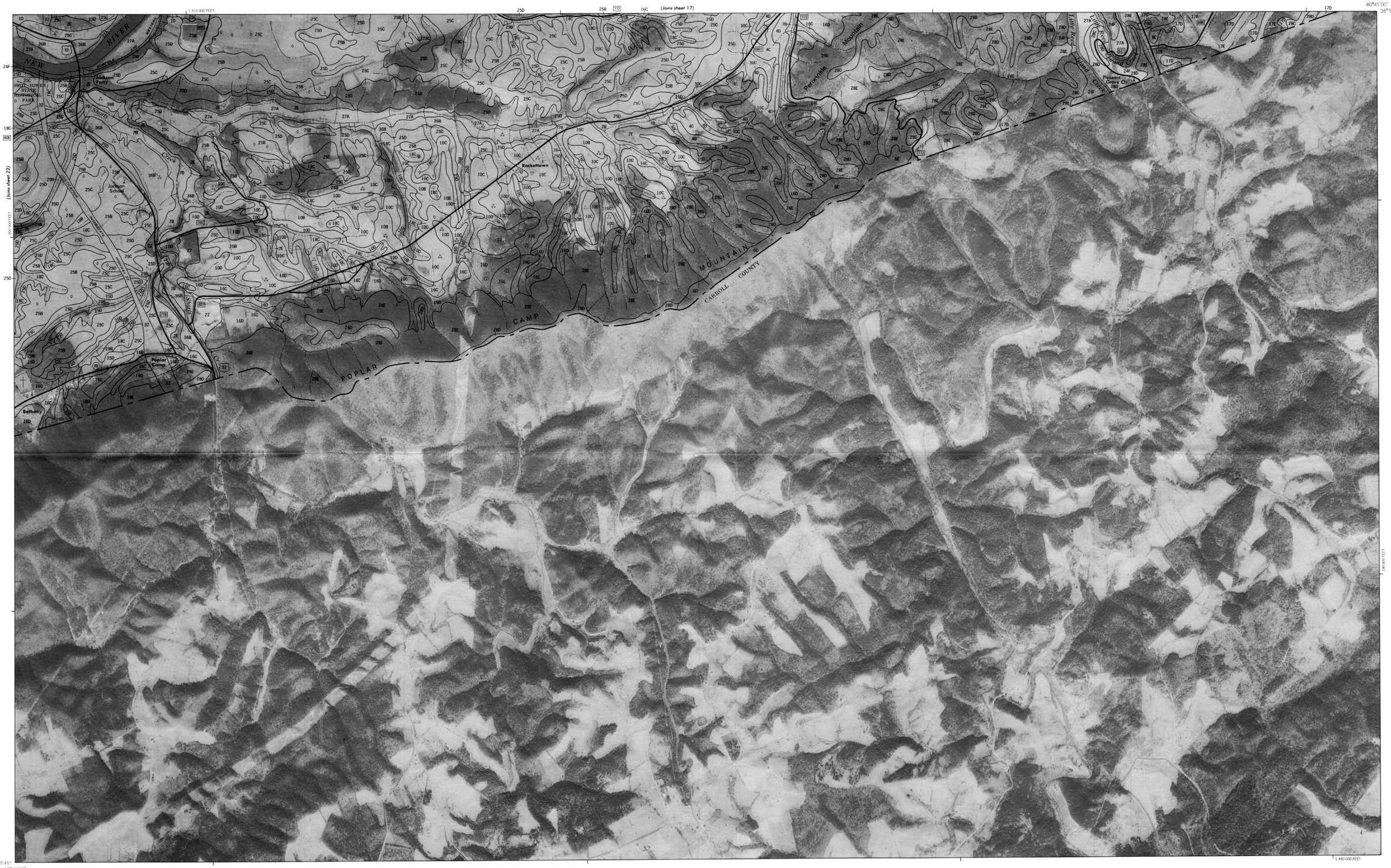
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF
WYTHE COUNTY, VIRGINIA
SHEET NUMBER 23

23
N



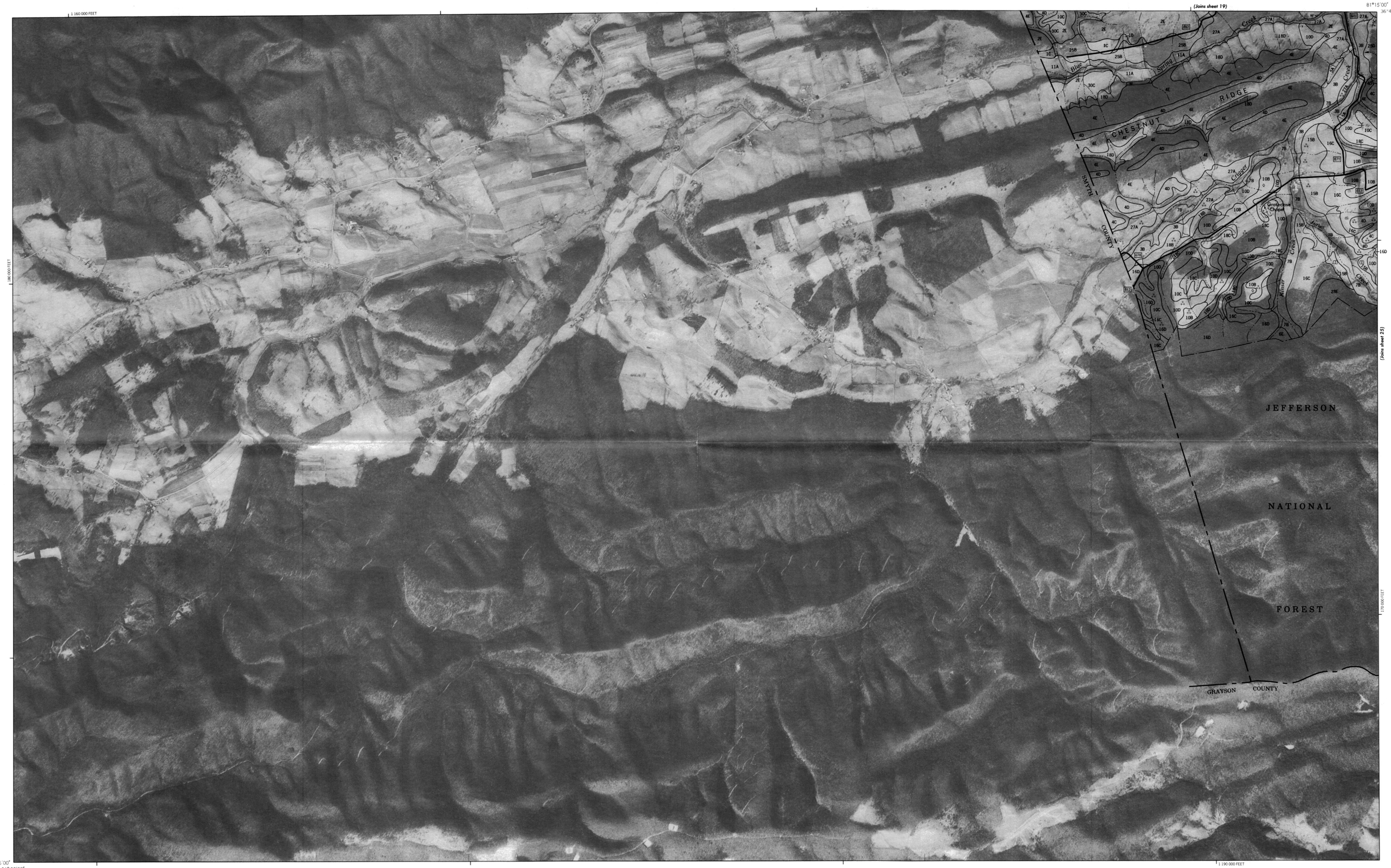
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

WYTHE COUNTY, VIRGINIA NO. 23

24

N



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

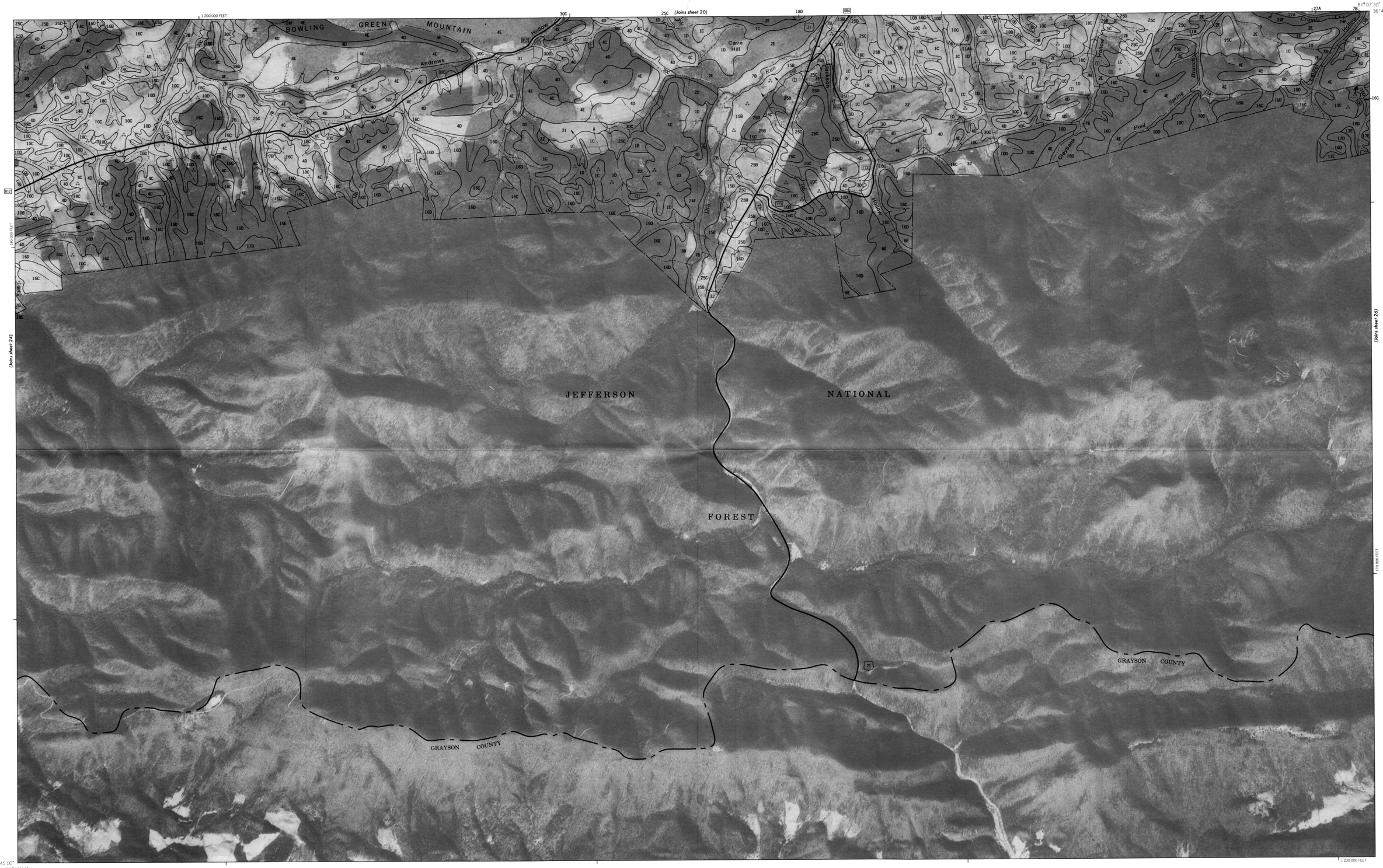
WYTHE COUNTY, VIRGINIA NO. 24

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF
WYTHE COUNTY, VIRGINIA
SHEET NUMBER 25

25

N



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

WYTHE COUNTY, VIRGINIA NO. 25

SHEET NO. 25 OF 26

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 MILE
1 0.5 0 1 KILOMETER
SCALE 1:15 840

WYTHE COUNTY, VIRGINIA NO. 26